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TECHNICAL REPORT  
NATICK/TR-81/015

**STIMULATING  
NUTRITIONAL AWARENESS AND ACTION  
IN MILITARY POPULATIONS**

EDITED BY

**OWEN MALLER, Ph. D.**

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**UNITED STATES ARMY  
NATICK RESEARCH and DEVELOPMENT LABORATORIES  
NATICK, MASSACHUSETTS 01760**



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# **STIMULATING NUTRITIONAL AWARENESS AND ACTION IN MILITARY POPULATIONS**

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Edited by

**OWEN MALLER, Ph.D.**

U.S. Army Natick Research and Development Laboratories

Proceedings of a Conference

Sponsored by

the

Biomedical Sciences Corps

Office of the Surgeon General, USAF

Bolling Air Force Base, Washington, DC

and the

Science and Advanced Technology Laboratory

U.S. Army Natick Research and Development Laboratories

Natick, Massachusetts

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The consensus of opinion and recommendations of the conferees was;(a) the initiation of DoD projects related to the change of food habits and dietary practices is needed. (b) the DoD offers decided advantages for the conduct of such a program and (c) this effort would not replace other projects by Federal Agencies but would stimulate cooperative efforts by others.

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## FOREWORD

Food is an extremely important resource in the world but so are the people who consume it. Humans eat not solely for survival. People desire foods on which they can thrive. They should be provided with sufficient information to select foods which promote well-being, health and maximize performance.

Members of the Armed Forces face the additional challenge of maintaining themselves in a continual state of combat readiness in stressful environments, make it difficult to engage in eating practices which promote well-being, health and performance. At the operational level, application of high technology to training and battle scenarios provide an increasingly sedentary workload in the Armed Forces. On the national scene, recognition of overfed and underexercised Americans in the Military has led to wide ranging discussions of the consequences of these factors to health, fitness, and combat readiness.

In 1976-78, interest in this area by the Chiefs of Staff of the Army and the Air Force, and the increasing national discussion on Dietary Guidelines for Americans, began to stimulate Armed Forces' representatives at Natick to initiate research projects for the DoD Food Research Program. In 1977 the Air Force requested Natick's Behavioral Scientists to plan a program to begin to attack the question of nutritional awareness and food habits.

The first step in developing this new program was to hold a conference to evaluate problems and to suggest courses of action to correct them. The development and implementation of the Air Force Nutrition Education Program was planned for a four-year period beginning in fiscal year 1980 but was unfunded. To facilitate discussions with other federal agencies on these matters, and to avoid interagency overlap, the major representatives responsible for these programs in USDA, HHS, and The Veterans' Administration were invited to participate in the Conference. To broaden the perspective, expert representatives from the DoD (including representatives from Great Britain) and academe who are familiar with the issues of nutrition education were asked to participate.

Referring to the general discussion as well as to the organized presentations, the consensus of opinion of the conferees was: (a) the initiation of DoD projects related to the change of food habits and dietary practices was needed; (b) the DoD offered decided advantages for the conduct of such a program; (c) and that this effort would not replace planned projects in the other Federal Agencies but would stimulate additional efforts by other agencies via technology transfer.

## AFTERWORD

Although plans for the development of a prototype Air Force Nutrition Education Program (USAF 0-5 and USAF 0-6) were initiated shortly after this conference was completed, in June, 1979, unanticipated funding problems delayed and finally resulted in the suspension of this project. In October, 1979, the House Defense Appropriations Committee sharply cut Natick's Joint Services Food Systems Technology project to decrease the effort in food shelf life, storage, packaging, and spoilage, which, according to Congress, is more appropriately carried out by USDA, etc. The Behavioral Sciences funding for the work under discussion here was a small, separate, and relatively invisible part of the large food technology project.

At about the same time, the Senate Agriculture and Defense Appropriations Committees completed a series of activities that resulted in the transfer of the resources of the DoD nutrition research program from the Letterman Army Institute of Research at the Presidio in San Francisco to USDA to be used as a base for organizing the new USDA Western Human Research Center. Since DoD had now lost its nutrition capability, the Senate statement said that DoD and USDA should negotiate so that USDA could carry out mission-related nutrition research for the Department of the Army on a reimbursable basis.

These developments raised questions within the DoD as to whether all nutrition or nutrition-related work currently underway in DoD should be performed by USDA instead of the DoD. This resulted in an immediate deemphasis of all nutrition-related work in the DoD Food Program at the Natick Labs. Included in this deemphasis was Natick's work in food acceptance, food habits, nutrition education, etc. In April, 1980, the Air Force suspended the nutrition education project, developed on the basis of this conference, due to "Congressional instructions to transfer DoD nutrition work to USDA, resulting in uncertainty as to who should perform the work".

Such events as described above are expected to continue in nutrition programs until a clear, coherent nutritional policy is established, coordinated with other agencies, and with Congress, and is implemented by the Department of Defense. Perhaps, the content of these proceedings will serve as an important cornerstone in stimulating the development of such a policy.

## ACKNOWLEDGEMENTS

Mrs. Pamela Main has provided invaluable assistance in all phases of bringing these proceedings to print. From the transcribing of presentations, from sometimes barely audible tapes, to communication with participants, her diligence, equanimity and meticulousness are appreciated. The helpful contributions of Barbara Edelman-Lewis, Alan Wayler, and Cynthia Dubose are acknowledged.

Although, many people aided in the organization of this conference, the continual assistance of Johanna Dwyer, Miriam Thomas, Max Milner and Colonel Filomena Manor and her staff from the conception of the conference to its delivery is especially acknowledged.

The opinions expressed are those of the conferees and do not represent the positions of the U.S. Department of Defense.

## TABLE OF CONTENTS

	Page
FOREWORD AND AFTERWORD	1
PARTICIPANTS	5
WELCOMING REMARKS Paul W. Myers	11
INTRODUCTORY COMMENTS Aaron Altschul	13
KEYNOTE ADDRESS Frederick W. Richmond	14
NUTRITION EDUCATION IN THE DEPARTMENT OF DEFENSE: PAST, PRESENT AND FUTURE John W. Cutting	19
NUTRITIONAL CHALLENGES FACING THE UNITED STATES AIR FORCE Filomena R. Manor	24
NATIONAL DIETARY GUIDELINES Christopher Hitt	31
NUTRITIONAL STATUS SURVEILLANCE AND INTERVENTION Howerde Sauberlich, Molly J. Kretsch, David D. Schnackenberg	37
DISCUSSION	51
NUTRITION AND CARDIOVASCULAR DISEASE: LESSONS FROM FRAMINGHAM William P. Castelli	59
OBESITY: AN EVALUATION OF TREATMENT George A. Bray	73
ALCOHOL CONSUMPTION: ITS EFFECTS ON CALORIE INTAKE AND DIETARY PATTERNS Cynthia Dubose	97
EXERCISE AS AN ADJUNCT TO DIETARY MODIFICATION IN THE PREVENTION OF DISEASE Dennis M. Kowal	103



## TABLE OF CONTENTS (Cont'd)

	Page
PLANNING FOR NUTRITION AND PHYSICAL FITNESS PROGRAMS Robert Buxbaum	122
WHAT IS NUTRITION EDUCATION? Joan Dye Gussow	126
EDUCATION ABOUT FOOD IS DIFFERENT THAN EDUCATION ABOUT NUTRITION Paul A. Lachance	132
THE MILITARY CONSUMER: COMMUNICATING THE BASICS OF NUTRITION Johanna Dwyer	146
EDUCATING CHILDREN TO EDUCATE THEIR PARENTS IN NUTRITION Helen A. Guthrie	156
SERVICEPERSON TO VETERAN: IMPLICATIONS FOR NUTRITION AND PHYSICAL FITNESS PROGRAMS Edwina L. McDonald	161
NUTRITION EDUCATION PROGRAM DEVELOPMENT: A RECOMMENDED DEVELOPMENT CYCLE AND ROLE FOR PROGRAM EVALUATORS Michael J. Wargo	167
DISCUSSION	181
A VIEW FROM THE OTHER SIDE: AN AFTER DINNER ANALYSIS Kenneth Corkindale	187
CONCLUDING COMMENTS Max Milner	190

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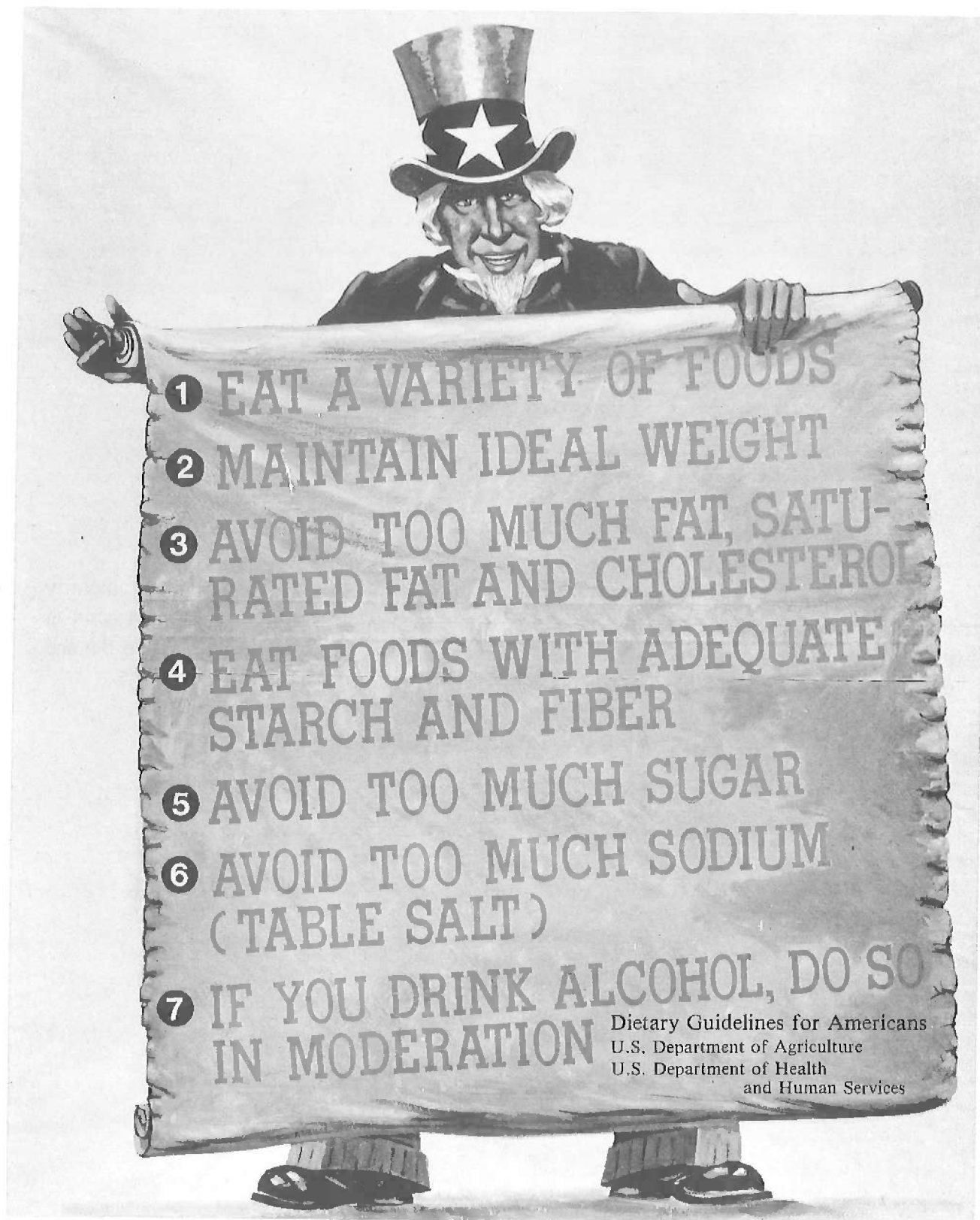
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One of the first requirements for solving our problems is that we confront them, identify them early, appraise them honestly, and avoid complacency or evasion. We are not good at it. Humans have never been good at it. As Charlie Brown said, "No problem is so big and complicated that it can't be run away from."

John W. Gardner — *Morale*, 1978



DIETARY GUIDELINES  
POSTER PREPARED BY  
BEHAVIORAL SCIENCES DIVISION  
NLABS FOR USE IN DINING HALLS  
AND CLUBS (1980)

PROCEEDINGS OF THE CONFERENCE "STIMULATING NUTRITIONAL AWARENESS  
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SPONSORED BY THE BIOMEDICAL SCIENCES CORPS,  
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USAF BOLLING AIR FORCE BASE, WASHINGTON, DC  
AND THE SCIENCE and ADVANCED TECHNOLOGY LABORATORY  
U.S. ARMY NATICK R&D LABORATORIES, NATICK, MA 1980

WELCOMING REMARKS

Lieutenant General Paul W. Myers

I am basically a neurosurgeon with a strong interest in nutrition. As I also act as a "health care executive", I am delighted to be with you today to talk about the future of nutrition education. The Air Force's greatest resource is its people. For this reason, it is important that Air Force personnel are encouraged to consume a diet that minimizes health risks.

As I see it, the area of nutrition holds great promises for the future. Let me take a few minutes to speculate about a new very exciting topic in nutrition. I am talking about the effect of diet on the activity of neurotransmitters. This topic has received a great deal of attention lately. As a neurosurgeon, it intrigues me for the simple reason that there is a potential for influencing mood, emotions and behavior through diet. It may be possible in the future to alleviate pain, reduce the incidence of such mental illnesses as schizophrenia and enhance general well being through diet. There is increasing evidence that the activity of many of the neurotransmitters are influenced by amino acids and carbohydrate levels in our diets. Neurotransmitters are those little bundles that carry messages from one neuron to the next synapse. Stop and consider for a moment that by maturity we reach 1 to the 11th power in neurons. These neurons are controlled by a variety of transmitter substances. It is these transmitter substances which are influenced by the foods we eat. That is, the amino acids in the proteins and the carbohydrates in the breads and fruits and vegetables influence the levels of various neurotransmitter substances found in the brain.

For example, serotonin carries messages about sleep, emotions and appetites. Let's use sleep as an example of the behavioral effects diet can have on behavior. Serotonin is made from the amino acid tryptophane. We know that serotonin levels go down in the blood after high protein meals and go up after high carbohydrate meals. Now, if serotonin is a sleep producer, you can see why you wouldn't want to eat a heavy carbohydrate lunch and then expect to stay alert and at attention. The role of our diet and its effects on the activity of neurotransmitters is an intriguing subject. The surface of our knowledge in this area has just been scratched and I think there are many avenues of research open for further investigation.

Now I would like to turn from the future to the immediate. As I mentioned before, I am concerned about the nutritional well being of Air Force personnel. It is important that they consume a diet which maximizes their general health and well being.

The Air Force faces many of the same nutritional problems found in the general U.S. population. One nutritional problem common to both groups is obesity which can result from

overnutrition. During the past few years, all of the services have been very interested in weight control and physical fitness. All Air Force personnel are now required to meet specified physical fitness and weight control standards. The objective of this program is to maintain the efficiency, health and well-being of the men and women in the Air Force. They are also expected to present a proper military image to the public. An individual cannot be overweight and present an appropriate military image. The Air Force program will be considered truly effective when all personnel adopt health care practices which lead to nutritional well being and physical fitness.

The Military Services have also had a long-standing interest in the role of nutrition as it relates to the efficiency of performance under conditions of work and stress. One concern of the Air Force at this time is to encourage valid nutritional judgements about proper diet. We need to make factually-based nutrition information available to Air Force personnel so they know what foods lead to good health and efficient performance. The failure of most current nutrition education programs is that we know a great many nutritional facts but we know little about what educational techniques should be used to effectively impart this knowledge to the nutritionally unaware. We have not been too successful in changing nutritional behavior. The final thought I'd like to leave you with is this. The development of a comprehensive cost-efficient nutrition education program should be the ultimate goal of this conference.

## INTRODUCTORY COMMENTS

Aaron Altschul

I would like to make a few comments about the nature of the meeting as I see it and the general theme of this session. First of all, I would like to point out that there are two sets of nutritional problems which somewhat overlap one another in our country's communities. One set is the malnutrition that derives from scarcity which is always a problem, particularly in poor groups and where there is social disorganization. The second problem is predominantly a problem of an affluent society. I have called it "affluent society malnutrition", and part of the consequences of this problem are some of the adult onset diseases, namely: obesity, hypertension, diabetes, and coronary disease. Both of those elements of nutrition will be covered throughout the sessions of this meeting.

The second point that I would make is that this meeting, particularly, deals with the issue of intervention. How do you intervene in the personal lives of people to improve their use of nutrition knowledge and thereby, improve their health? There are quite a few aspects to answering this question. First of all, you have to know what the critical issues are. One of the speakers will discuss some of the issues. Another question is the one of nutritional status and how you work it out to include surveillance. Another question is — What are the special properties of intervention in an institution? The Armed Forces represent an institution as do the schools and other institutions where there are peculiar properties of nutrition intervention and where one might contemplate perhaps a greater efficiency of intervention in those circumstances. Next we are going to hear about the history and problems of nutrition education in the Department of Defense.

Finally, there is the very broad question of how far can you go with intervention? How much of the problem is attributable to the individual and how much is the problem of society? How general can nutrition intervention be in the face of individual genetic differences? Some, or all of these questions start with technical and scientific issues: namely, what are the facts and what is the best interpretation of these facts? However, sooner or later the nature, the breadth and extent of the problems become a matter of public issue. People like our next speaker become involved in making the rather critical decisions on the outcome of the dialogue between the scientists and the public servants. We are fortunate that Congressman Richmond occupies a very key role in this dialogue and in this decision-making process. As chairman of the Subcommittee on Domestic Marketing Consumer Relations and Nutrition, he has expanded the role of that committee to include nutrition as well as other aspects of agricultural problems. His subcommittee has jurisdiction over the administration of the six-billion dollar food stamp program which is one of the great interventions of all time, and it is far greater than any other intervention that we have tried in the foreign arena. It is, therefore, very appropriate that this meeting be opened by a person who has shown an interest in the field and who occupies such an important role in making the decisions on the type and extent of intervention involving nutrition. It is my pleasure to introduce the Honorable Fred Richmond.



## KEYNOTE ADDRESS

Honorable Fred Richmond

As Chairman of the House Nutrition Subcommittee, I am particularly pleased to be the keynote speaker at this Conference on Nutrition Education sponsored by the military services.

Before I go any further, I want to congratulate Dr. Maller of Natick, your program chairman, for the excellent job he has done in bringing together such a fine array of dedicated civilian and military professionals who obviously share a commitment to improving the diet and health of those serving in the Armed Forces. The presence of General Myers, I believe, assures us that the Department of Defense shares this commitment, and we all know that when a General says he wants something done, it has a way of happening.

When we pause to consider that those of you assembled in this room represent over 2 million active duty personnel and 10 million dependents located throughout the entire world, we should recognize the truly momentous task we are undertaking here today.

The challenge is great, the scope is broad; the goal is clear. We are not here to debate the need for improved nutrition. The problem before us is how best to develop programs which will make service persons aware of the impact of diet on their health and fitness and provide them with the information and motivation to make wise food choices.

A moment ago I purposely said programs. Obviously no one program will perfectly meet the needs of a military network that extends from tropical locations such as Manila to Arctic areas like Point Barrow. Climate, military duties, installation size, and proximity to civilian population centers are only some of the factors which dictate the need for innovation, flexibility and variety of approach in your planning.

I think I can best serve you by sharing some of the conclusions about nutrition education which my Congressional colleagues and I arrived at after two years of extensive hearings. Although we focused on the needs of the public at large, most of our findings could easily and appropriately be applied to your own situation. After all, deeply engrained attitudes and habits don't change at the base gates.

According to a recent survey, 77 percent of our population include "nutrition" as an important consideration in their food choices and dietary practices. Yet, how are we to take this claim when we assess:

- the increased consumption of fats, cholesterol, salt and sugar;
- the fact that more than half the foods we consume are highly processed;
- that one-half or more of our population is obese, and
- most significantly, Senator McGovern's revelation that half the deaths in this country are caused by diet-related diseases.

After holding a number of hearings at which hundreds of scientists, health professionals, community workers and consumers testified, I can report to you that the American public is deeply concerned about nutrition. Again and again witnesses told us of their desire to learn more about the relationship of diet to health, to learn how to make wise choices in the marketplace, and to learn how to choose a sound diet for themselves and their families.

The most common complaint was not that there is a scarcity of information; to the contrary, there is apparently an overload. Food faddists, charlatans, promoters, marketers and advertisers are each shouting their own slogans and cure-alls — all based on "nutrition". Witnesses were united in their frustration to find a single, scientifically accurate, unbiased and useful source of nutrition information.

On the basis of our hearings, we were able to distinguish three levels of the public need for nutrition information:

- At the most basic level, the public wanted general information about the relation of diet to health. For the most part, these persons were in good health and wished to maintain or improve the quality of their lives.
- A second group was divided into what we may call "risk groups", such as the poor, the elderly and the obese. People in these and other vulnerable groups required more detailed information coupled with specific dietary advice.
- A third category included individuals who were suffering from chronic diet-related diseases and were, or should be, receiving medical care.

My colleagues and I decided that our first obligation was to insure that the public would be provided with accurate and timely nutrition information. Since the Federal Government is the logical provider of such information, we examined the quality and effectiveness of its public information programs.

To our dismay, we discovered that our Government currently funds 33 separate, uncoordinated programs, most of which fail to reach the population they are designed to serve. In spite of the tremendous strides in human nutrition research, the increased understanding of human behavior and motivation, and the advances in communicative arts and skills, we are still apparently living in the stone age of nutrition education.

Millions of dollars are being spent on antiquated, depression-age pamphlets, inane television spots and patronizing self-improvement programs. It is a disgrace that our leading nutrition education program for the poor reaches only 2 percent of its audience; that our Head Start Program reaches only 15 percent; our program for the elderly only 2 out of 10; and our Consumer Adult Education Program only 2 in 100.

Clearly, such overwhelming documentation demands that our efforts be guided by a policy which coordinates responsibilities and activities and holds government programs accountable for their effectiveness.

The "Old Nutrition Education" characterized by outmoded strategies and inefficient programs must be replaced with a "New Nutrition Education" that is:

1. Diet and health oriented;
2. Based on objective and current scientific information;
3. Comprehensible and useful;
4. Attractive, appealing, and motivating;
5. Community based;
6. Available where and when consumers want information, be it on the airwaves, in supermarkets, or local papers;
7. Long-term and continuous;
8. Coordinated with other educational efforts in the public and private sectors.

In the remaining time, I would like to offer my suggestions about how this new nutrition education might best be translated into a nutrition education policy for military programs.

Before you begin any program, I advise you to make a number of basic determinations.

First: Identify the nature of the problem. If you think that overweight or obesity in the service are problems, find out how many personnel are involved and how you might best reach them and modify their behavior; while general information might help some avoid those conditions, those who are chronically or acutely obese need special medical care.

Second: Isolate and assign a specific, identifiable and accountable budget and staff to administer and evaluate your programs. I cannot overemphasize the need for evaluation. Because of the high degree of variability in your particular circumstances, it is especially important that you perform the social research that will allow you to measure and improve your effectiveness. I also suggest that you don't be overambitious. Too often, high sounding phrases mask the absence of clearly defined and measurable goals.

Third: Coordinate your efforts. Don't make the same mistake that the Federal Government has made. We cannot afford the luxury of Army nutrition, Navy nutrition, Air Force nutrition, and Marine nutrition.

Beyond these general guidelines, there are a number of specific actions that should be a part of any successful program:

1. Provide informative, interesting and accurate information about nutrition in places where personnel are confronted with food choices.

The mess hall — sorry about that, I mean the base dining room — and the Commissary are ideal locations for the posting and distribution of nutrition information materials. Following our Subcommittee's Hearings, the National Institutes of Health and the Giant Food stores have embarked on a highly successful campaign to provide shoppers with appealingly designed pamphlets and posters. I see no reason why you couldn't undertake a similar project.

2. Revise your standard daily menu to allow for a greater variety of meals or food choices that are lower in fat, sugar and salt.

I know that Natick sponsored a debate on the dietary goals two years ago without coming to any consensus.\* I think it is a great shame that so much time has been lost on fruitless arguments over national policy when, in fact, no health professional worthy of the name would recommend a steady diet rich in fat, sugar, and salt. When I was in the service, cooks prepared chow and we ate in the mess hall. Now, I read in *The Washington Post* that military "chefs" are winning international gold medals in Paris for entrees and sauces that would give a Private the gout.

I am shocked to learn that the nutritive analysis of the Armed Services' master menu for May is 4,500 calories a day for both men and women. I find this figure particularly indefensible when the Food and Nutrition Board of the National Academy of Sciences recommends no more than 3,000 calories for an athletically active male and even less for a female. An army traditionally fights on its stomach, but the modern military is apparently in the midst of a Battle of the Bulge.

Since an average of over a million and a half meals a day are served in military dining rooms, I think it is time we took a cue from Weight Watchers and started controlling the size of our portions. In addition, dietitians and meal planners should insure that a variety of low calorie, low fat, low sugar and low salt selections are available. Nutrition educators place great emphasis on providing people with information so they can make wise food selections. What better place is there to begin than in the post dining hall.

3. Develop a coordinated physical fitness — proper diet program.

Too often physical exercise is viewed only as a way of working off calories. Even if calorie consumption were reduced, it would still be important to educate military personnel about the relation of nutrition to stamina and health. No program should be developed which does not include input and participation by physical fitness experts.

4. Finally, and most importantly, dare to be innovators.

Involve the serviceman's whole family through base-sponsored education programs. Military bases are, of course, communities. Of all the testimony that was presented before us, my colleagues and I were especially impressed with the activities of the Cincinnati Nutrition Council.

\*Some of the presentations at this meeting appear in the Activities Report of the Research and Development Associates for Military Food and Packaging Systems, Inc. Vol. 30, pp. 46-87 1978

Within the first year of its operation, this innovative experiment in community nutrition education reached more than half the population of Cincinnati through an array of services that included a speaker's bureau, a nutrition hotline, a newsletter, a consulting service for physicians, public service spots on T.V. and radio, ads and articles in local newspapers, continuing education programs for adults and developing materials for use in supermarkets, cafeterias, and schoolrooms. As I said earlier, habits and attitudes do not stop at the base gates. A truly successful program should involve the entire military community.

During the next three days you will hear from a number of eminent experts in nutrition education, many of whom have testified before my Subcommittee. I am confident that together you have the will, the resources and the skills to devise well planned, coordinated, and evaluated nutrition education programs for our services. For my part, I pledge you my support and willingness to assist you in any way possible.



## NUTRITION EDUCATION IN THE DEPARTMENT OF DEFENSE: PAST, PRESENT AND FUTURE

Colonel John W. Cutting, M.D.

Congressman Richmond, General Myers, Ladies, and Gentlemen:

I am honored to have been asked to participate in this program concerning the nutrition education of military personnel, although I feel that I am an amateur when I look over the roster of participants. Until about a year and a half ago my interests and activities in the area of nutrition and health education were rather superficial, having been trained and employed in epidemiology and general preventive medicine. Since then, however, I have become involved in the Army nutrition program in several aspects within the Office of The Surgeon General and have, of necessity, expanded my horizons considerably. But, my standing is still that of an interested amateur.

The first question that must be raised in discussing any program proposal is: What is the purpose of the program? Specifically, what do we hope to achieve by providing nutrition education for military personnel? I believe there are two main reasons for this program. First, military readiness depends on a fit fighting force. Fitness depends on many things and correct nutrition is one essential factor. Soldiers, sailors, and airmen must eat properly to ensure their fitness. To ensure this we must provide them in an appropriate format the information they need to select the correct foods in the correct proportions and quantities and we must motivate them to act accordingly. The second reason for a nutrition education program is tied in with the national dietary guidelines for a healthy, fit population. If military personnel can learn correct food consumption habits while in the service, they will be likely to continue them after they leave active duty and to teach the same habits and practices to their families. This will improve the nutritional status of the nation as a whole in this and succeeding generations.

Either of these reasons is sufficient justification for establishing a program, but we must be aware that it is far easier to talk about such an accomplishment than it will be to achieve it. There are many difficulties along the way.

I will spend a few minutes now on what has been done in the past by the services in the area of nutrition education and what is going on at the present time. Then I will go on to where we might go from here and some of the problems faced.

Historically, little or no nutrition education was presented in an organized fashion prior to World War II. There was certainly no program directed from the War or Navy Departments that I could find evidence of. In 1940 the War Department issued the first guidance on the nutritional content of rations served. It was quite general for the most part saying little more than that the diet should be nutritionally balanced. Earlier guidance had indicated that known facts about nutrition should be considered, but little else was said.

During the war, Commanders were urged to teach the servicemen the value of eating properly. However, no materials were provided, and each Commander was left largely to his own devices to develop whatever type of program he deemed appropriate. In actual practice

most real educational programs were developed and implemented in response to recognized nutritional problems. In general, these rather informally directed programs were successful, and nutritional problems were uncommon for the American service member, except in some isolated areas where supply problems were very great, and for prisoners of war.

Since that time the major effort in the area of nutrition has been in the areas of ration development and ration delivery. There is no question that the rations now available to our service members, both in fixed installations and in the field, are better than those provided thirty and forty years ago. And a wide variety of special rations have been developed for special situations as far removed from the battlefield as the surface of the moon.

In Vietnam there were major efforts to meet the stated objective of at least one hot meal every day for every soldier. Innovations in delivery of rations resulted and were quite successful.

However, while all these other efforts were underway, little was being done in the area of nutrition education. Only one group of individuals has been regularly providing education, and that only to special groups of individuals. I speak of the hospital dietitians and the patients who have been referred for instruction. In nearly all instances these dietitians are presenting nutritional information in response to some clinical or medical condition. The range of subjects is broad, from those with diseases like diabetes, hypertension, or atherosclerosis to those with normal but special conditions, especially pregnancy. Recently there have been increasing efforts directed at individuals who are overweight, as there is more knowledge of the hazards of obesity as well as more emphasis on physical fitness and appearance.

Some of the military hospital based dietitians have been getting out of the clinical setting and into the community to deliver nutrition education in different environments. Some of these have been directed at troop populations while others have been in the schools attended by dependent children. But these are not centrally directed or coordinated programs. Instead they are based on the interests of the individual dietitians, of the community authorities, military and civilian, and limited by the amount of time available in the schedules of the dietitians. Today, such programs constitute virtually the only efforts underway within the military, and the clinically oriented efforts far exceed those in the community. Colonel Manor will discuss new Air Force programs with nutrition components, but in general only infrequently do the soldiers, sailors, and airmen receive any real nutrition instruction.

Since about 1970 there has been an ever-increasing amount of discussion about nutrition education for the service member. In November of that year, the Assistant Secretary of Defense for Health and Environment directed the Army to develop a course outline or lesson plan designed to provide standard instruction to all service members in four areas. These were:

- a. The fundamentals of nutrition and food composition.
- b. How to select a proper, balanced diet.
- c. How to reduce the caloric content of the diet, while maintaining it in a balanced form, and

d. Food faddism and nutritional fallacies.

A detailed course outline was prepared covering these points and was submitted to the Assistant Secretary in March of 1971. Apparently the program died, for nothing ever came of it.

In 1973 the DoD Food Planning Board asked for suggestions on what to include in an education program, but little if anything resulted from that request. By 1975 the Army had developed a pamphlet called, "Nutrition - Get It Together" which was intended to be distributed to all training centers for issue to trainees. However, for various reasons, some stated, some not, the pamphlet was never used extensively. Thus while no nutrition education is being provided in a standard, organized fashion to the service members, the need for such a program is felt even more strongly than ever, and in the newest edition of the DoD Manual 1338.10M issued in November of last year it is stated that "Nutritional education will be administered so as to provide the members of the Military Services with a fundamental knowledge of normal nutrition." In recognition of the resources available within the Department of Army at Natick and Letterman Army Medical Center, the Army was directed to develop the educational program for use by all the services -- which brings us to this conference and the future.

Essentially we are now starting from virtually nothing and any effort will be an increase. However, just an increase in effort is not the goal we must have in mind. Let me repeat the purpose of providing nutrition education to service members. I said that the individual must know how to eat correctly in order to maintain a high level of physical fitness and thus contribute positively to military readiness. And I said that if an individual develops the proper eating habits while in the service he or she will be more likely to continue those desired practices after leaving the service and thus contribute positively to the national goal of a healthy, fit population. But this is far easier to talk about than to achieve.

I should like now to digress slightly and talk a bit about health education in general rather than just that portion of it related to nutrition. The Fogarty International Center for Advanced Studies in the Health Sciences with the American College of Preventive Medicine recently published a series of task force reports in a volume entitled, **Preventive Medicine, USA**. One of those task forces examined the area of consumer health education and I think it would be worthwhile to mention some of the conclusions presented. Their first task was to develop a definition, a task which apparently was not so simple as it might seem, for they developed six points to describe the process. In their definition "consumer health education" is a set of activities which:

1. Inform people about health, illness, disability, and ways in which they can improve and protect their own health, including more efficient use of the (health care) delivery system;
2. Motivate people to want to change to more healthful practices;
3. Help them to learn the necessary skills to adopt and maintain healthful practices and lifestyles;

4. Foster teaching and communication skills in all those engaged in educating consumers about health;

5. Advocate changes in the environment that facilitate healthful conditions and healthful behavior; and

6. Add to knowledge via research and evaluation concerning the most effective ways of achieving these objectives.

In brief, consumer health education is a process that informs, motivates and helps people to adopt and maintain healthy practices and lifestyles, advocates environmental changes as needed to facilitate the goal, and conducts professional training and research to the same end.

The chairperson of the task force on Health Promotion and Consumer Health Education, Ann R. Somers, discussed some of the principles of health education, which I believe to be particularly pertinent to us in our endeavor here. She stated that individual behavior and lifestyles are influenced by multiple factors, some of which are internal to the individual and some external, either environmental or societal. Health education must address itself to both. She went on to say that the justification for health education depends (largely) on the conviction that good health demands individual knowledge, individual responsibility and individual participation in making informed choices about his or her life.

Throughout these statements you can substitute the words "nutrition education" for "health education" and each remains true and pertinent to our task. However, the task as I mentioned is not an easy one. We enter the arena already behind in the score, for our audience has had 18 or more years of training and education of one sort or another in nutrition. That can be a tremendous handicap, enough to cause many to question the wisdom of expending any effort. Indeed I have asked myself that question and find it difficult to come up with hard data to justify action. Then I turn to the other side of my public health character and find I cannot ignore the possibility, even if it is remote, that such an effort might be successful in at least a few. If we can prevent a few early deaths, a few cases of chronic disability, I believe the effort is justifiable. We must remember that in terms of money, time, quality of life and human resources, rehabilitation is more costly than prevention.

In addition to the 18 years or more of training that our subjects have had before we have our first opportunity to present our information, we have another adversary. This is basically the tremendous amount of advertising to which we are all bombarded, daily. The jingles for soft drinks, candy bars, and other relatively non-nutritious snack items are repeated so often, little children learn them and learn from them patterns of behavior. In terms of money we can never hope to compete with the dollars spent for these commercial messages that surround us. Instead we must concentrate on the quality of our product, the nutrition education program. Our program must be accurate and understandable. It must be directed at and be relevant to the needs of our audience as it perceives those needs. One danger to be avoided is trying to pass on too much new information in too short a time. As B. E. Anlyon says, "Already many people are drowning in a sea of fragmentary facts about nutrition and food, without any real idea as to how the data relate to present problems, let alone future concerns."

Ideally, what we institute for the services should be just one part of an increased national nutrition education effort. But we cannot really justify waiting until programs in the civilian community are started. Our organizational structure should permit us to provide a program to everyone in the service in a relatively short time. We should not, however, expect it to be perfect from the first, as the realm of health education is really in its infancy in many ways. As Ann Somers states, "The precise effectiveness of most current health education and health promotion programs and practices is unknown, that is to say, the state of the art is still primitive. Substantial research is needed to identify specific and long term results. However, **we learn only by doing and measuring, not by doing nothing.** The practice of health education can no more be put off until "all the data are in" than can the practice of medicine. Moreover, there will never be a time when "all the data are in" since the whole context of American society is constantly in flux."

In closing, I would say that I cannot describe for you in detail the military nutrition education program we should be striving for. It should be designed to take into consideration the learning experiences our service members have already assimilated into their lifestyles and practices. It should be designed to modify behavior where needed and reinforce where appropriate. The policies and practices of our dining facilities must be taken into consideration. These should be modified as needed to produce a coordinated integrated program that makes our desired result not only possible but sought by the service member. Finally, there must be evaluation procedures included in the program to guide us. We must progress toward the goal of developing an informed service population which actively participates in a total nutrition program that preserve their fitness and protects their health. Your task in this undertaking is not an easy one but I believe it can and will be a successful one.

## NUTRITIONAL CHALLENGES FACING THE UNITED STATES AIR FORCE

Colonel Filomena R. Manor

By virtue of a joint service regulation, the Surgeons General of the Departments of the Army, Navy, and Air Force are tasked to provide qualified representatives to assist in nutrition education programs. Specifically, that regulation states, "personnel must be educated to select food to insure an adequate diet and maintenance of desirable weight." It was in my capacity as the representative of the Air Force Surgeon General that I requested a research project be initiated to develop and evaluate a program of nutrition education available for all Air Force personnel. It was intended that this program effectively make factually-based nutrition information available to allow valid nutritional judgements and behaviors to counter the use of food habits which directly affect health and performance efficiency. The U.S. Army Natick Research and Development Command was tasked to complete the requested nutrition education research project. This conference is then the first phase of that research project. As stated in the initial letter you received, the topics to be addressed at this conference include:

1. What should be the goals of a nutrition education program for the air force?
2. What educational programs are likely to attain these goals?
3. How can these programs be effectively organized and integrated?
4. How can we assess whether these goals or objectives are being met?

The information gained at this conference will be used in moving the project into the developmental and evaluation phases.

My goal today is to provide you with some background information that will tell you where the Air Force is now in terms of feeding programs, health care facilities and nutrition education programs and invite you to help us confront the nutrition education challenges facing the United States Air Force.

Food or subsistence is treated as a separate entitlement for all active duty personnel. All officers receive as part of their pay, a monthly allowance for housing and subsistence in an amount which is set by Congress. Enlisted personnel who are married also receive a basic allowance for housing and subsistence as part of their monthly pay. The amount this individual receives for subsistence is based on actual food cost values and is recomputed annually or semiannually if food prices are rising rapidly. Unmarried, enlisted personnel live in the barracks on base and do not receive allowances for either housing or food. These individuals are entitled to 3 meals daily at no cost from either a base dining facility or a hospital food service if they are assigned duty in a medical facility. Thus, officer and married enlisted personnel may use all or more than their subsistence allowance to obtain meals wherever they choose to eat. Provisions are made to provide unmarried enlisted personnel with three meals daily, but if they choose to eat outside of designated Air Force feeding facilities, it is from their own funds.

Air Force personnel actually consume their meals in numerous locations.

1. On a flying mission, the flight crew can obtain inflight meals from an inflight kitchen. These may be either a cold box lunch or a hot TV dinner type meal.

2. During refueling stops, the flight crew has available to them food, a fast food type snack bar, or vending machines located near the flight line. Depending upon the duration, time of stop, and local facility availability, enlisted personnel may go to the base dining facility for a meal.

3. All other personnel and flying personnel at their home base consume meals in a variety of locations.

- a. All officers and married enlisted personnel who receive the basic allowance for subsistence will normally eat 2 meals at home or in an off-base eating establishments. Depending upon the hours they work and the food service facilities available locally, the meal eaten during the duty shift may be brought from home or be consumed in a food service facility on base such as the club, a snack bar, the base dining hall for enlisted personnel, or from vending machines or from an off base food establishment, usually a fast food facility.

- b. Single enlisted personnel are entitled to three government furnished meals daily in a base dining facility; in fact, these individuals eat only an average of two meals per day in the dining hall. The third meal not consumed in the base dining facility would then be an on or off base fast food meal, a cold meal in their barracks room, or from a vending machine, or no meal at all. Obviously, the days are gone when the military dining facility is the primary source of meals for our personnel. The choices not only of what they eat, but also of where they eat can impact on their nutritional intake. Thus, it is imperative they have accurate nutrition knowledge in order to make valid choices.

## AIR FORCE HEALTH CARE FACILITIES

Health Care Delivery Resources are available at 121 United States Air Force medical facilities. Within the United States, 65 of these facilities are hospitals with a range of 10 to 1000 operating beds. There are one or more dietitians assigned to those 29 hospitals which have more than 50 beds. The remaining 36 stateside hospitals have at least 3 or more diet therapy specialists assigned to them. These specialists are equivalent to the level of the dietetic assistant by American Dietetic Association standards. There are one or more dietitians assigned to seven of the 16 overseas hospitals which have 30 or more operating beds. The remaining 9 overseas hospitals have at least 3 or more diet therapy specialists assigned. There are no dietary personnel assigned to clinics.

The United States Air Force hospital system is based on the concept of regionalized medical care with facilities of different sizes and capabilities in specific geographic subdivisions. The United States is divided into areas, each served by an area medical center; for example, in the west, Travis is the medical center. Each area is further subdivided into regions, each served by a regional hospital (Fairchild and March AFB). The remaining bases will have either a

small hospital or clinic to provide primary medical care to the local Air Force population. Authorized individuals requiring medical care, including nutritional services, not available at their local medical facility normally will be sent to the nearest Air Force Regional Hospital or medical center or the nearest DoD Regional Facility which can provide the care they require for example, (Andrews AFB — Bethesda or Walter Reed).

A similar system to the one described is in operation in Europe and in the Pacific. In addition, the C9 and C141 aircraft provide aeromedical evacuation system support and return patients to the Continental United States, when essential. The dietitian and diet therapy personnel resources are used in the Air Force in a similar manner as their use in civilian hospitals. Dietary personnel provide nutritional care to inpatients and outpatients and manage the medical facility food operation.

All Air Force hospital food services write their own menus. All inpatient selective menus are reproduced locally on standard Air Force forms. The Air Force forms themselves have been designed to include information on the basic 4 and other food groups and basic information on the U.S. Dietary Goals in an effort to educate and influence hospital patient food choices.

For those patients not on therapeutic diets, the sensible limited intake diet (acronym SLIM) is identified on regular diet selective menus to assist patients in selecting a well balanced calorie restricted diet, while hospitalized. Handouts such as this on the SLIM program are often available in the hospital dining rooms.

## **NUTRITION EDUCATION PROGRAMS**

As resources permit, nutrition education provided within Air Force medical facilities by dietary personnel includes the following programs:

1. Inpatient and outpatient individual diet instruction.
2. Group outpatient diet instructions for
  - a. Weight reduction and behavior modification
  - b. Patients with diabetes
  - c. Hypertensive patients
  - d. Patients with hyperlipoproteinemia and
  - e. Prenatal patients

Resources seldom permit the time for Air Force medical personnel to participate in preventative nutrition education programs. However, where individuals have the expertise and interest, weight control and behavior modification programs may be implemented for active duty personnel and/or dependents. In some instances, normal nutrition may be taught in base child care centers and schools; to local groups such as wives' clubs, boy and girl scouts, or as part of general health outreach programs.



The Air Force Health Education Program (acronym HEP) was established on 1 July 1977 by the Air Force Surgeon General. The program is designed to provide informational and educational experiences to better enable all who receive Air Force medical care to increase their health awareness. HEP intends to accomplish the following objectives:

1. To improve the quality of life for Air Force personnel and their dependents by promoting health related behavior changes.
2. To reduce the personal and economic impact of illness through preventing disease and ensuring that patients follow prescribed treatment; and
3. To interest health care providers in patient education as an essential part of high quality health care.

The health education program operates primarily at two levels — a central office for Air Force-wide coordination and health education coordinators for base-level coordination.

The central office, a division of the School of Health Care Sciences, is housed at Sheppard Air Force Base, Texas, provides information and assistance to health education coordinators by maintaining a multimedia repository of resource materials. It evaluates the many education programs available and offers guidelines and consultations for health education coordinators to develop individualized programs. Printed materials, audiovisual programs, and/or program sources are available upon request. By distributing information to whoever requests a program, duplication of effort is prevented at the base level. The central office with assistance from consultants, develops new programs as needs for them are identified. It is also responsible for planning ways to evaluate and monitor the effectiveness of health education programs.

Health education coordinators have been appointed at each Air Force medical facility. Each coordinator is a medical service officer whom the director of base medical services or command surgeon has appointed to administer the base or major command health education program. The coordinators plan and organize the health education process at their bases with the assistance of other health professionals. They discover what education programs are in use, determine what new programs are needed, and identify skilled individuals willing to conduct the educational programs. The coordinators may contact the central office to request resource materials on specific topics of interest to support their local programs. The central office and health education coordinators promote both preventive health programs and maintenance programs for specific medical conditions. Hospitals and clinics with continuing, successful health education programs will assist in the goal to bring about a beneficial knowledge and behavioral change to improve the health of Air Force people.

What does the nutrition portion of the program contain? It contains the following components:

- a. A contract packaged program for patient education covering these diseases or conditions — diabetes, sodium restricted, and obesity. It contains no diet instruction component.

b. Commercial sources of diet information.

c. A videotape "Food for Health — an Eating Plan" covering the subjects of cholesterol and weight reduction was created by Captain Renoudet an Air Force dietitian as part of her Master's degree requirements.

d. Three weight reduction/behavior modification programs from Tinker AFB, Carswell AFB and Spangdahlem, Germany, are available.

A request for a film on basic nutrition for test pilot's school at Edwards AFB could not be fulfilled.

The Health Education Program provides an all ready available avenue for dissemination of nutrition education materials which may be developed through this proposed research project.

### **THE HEART EVALUATION AND RISK TABULATION (HEART) PROGRAM**

Cardiovascular disease is the largest single cause of death and disability other than injuries in the Air Force. Heart attacks seem to strike during the most productive years, placing the individual's health and the Air Force mission in jeopardy.

Based on research from Purdue and other civilian programs, it is believed that the incidence of cardiovascular disease in the Air Force can be significantly reduced through a program aimed at high risk individuals. HEART recently received a congressional go-ahead with the authorization and funding of the program under the fiscal year 1979 Defense Appropriation Act.

The initial funding has allowed HEART to sign a contract to develop a systematic approach to screening Air Force personnel and reducing their risk. The contractor will then demonstrate the program at six Air Force bases beginning in FY 1980. High-risk candidates will be invited to participate in an individualized and group counselling program that will address ways to change dietary habits, stop smoking, and alter other risk factors. Depending upon the results of the HEART program test, it has been requested that the nutrition education portion of that program be coordinated with other Air Force nutrition education programs.

### **CURRENT AREAS OF NEED FOR NUTRITION EDUCATION**

The United States Air Force Physical Fitness and Weight Control Program requires each Air Force member to maintain his or her weight within prescribed standards and maintain a physical appearance that shows a proper military image. People who weigh more than they should are evaluated medically and are required to take part in a remedial weight reduction program until he or she achieves the maximum air force weight standard. Assessment of weight status is determined using a standard based on age and height. A 3-scale nomogram used to quantify body fat is available to adjust the weight standard of non-obese male members who exceed the maximum air force weight standards due to muscular build or large bone structure. Persons who are placed on the mandatory weight control program may receive nutrition education for weight control from local medical personnel, but usually receive only limited follow up or support from this source. Persons who fail to achieve and maintain the

prescribed weight standards may be separated from the air force. Providing nutritionally sound weight reduction information for individuals in the remedial weight reduction program as well as for those interested in restricting their daily caloric intake will be of high priority in any Air Force nutrition education program. Base and hospital food service operations are encouraged to make a calorie restricted (SLIM) meal plan available to patrons who are on the mandatory weight control program or those who wish to control their caloric intake.

The time allotted to nutrition, diet, or weight control education in basic military training and flight training programs is very limited. During basic military training, the basic trainees have a two-hour lecture pertaining to nutrition, balanced diet, physical fitness, and the Air Force weight control program.

The Undergraduate Pilot Training Program allots one hour to the topic of self-imposed stress. This includes a discussion of the self-imposed stresses brought about by alcohol, smoking, drugs, and poor diet as they pertain to the Air Force flying mission. The concern with diet is as it relates to hypoglycemia.

Some of the programs which train various professionals within the Air Force incorporate varying amounts of nutrition education.

1. The first physicians will graduate from the Uniformed Services University of the Health Sciences (Acronym USUHS in 1980. Graduates of that program will have had 10 hours of normal nutrition integrated into a first year biochemistry course and 10 hours of normal and clinical nutrition in their second year plus the possibility of elective nutrition related clinical clerkships or research projects during their four-year program. LT Colonel Thelma Arnold, an army dietitian with a Ph.D. in nutrition, is on the university faculty and teaches the nutrition course, and is in attendance at this meeting.

2. The one year residency in aerospace medicine at the School of Aerospace Medicine, Brooks AFB includes a basic nutrition review, specific flight feeding problems, current nutrition topics, and an opportunity to eat a lunch that is sodium, fat, and cholesterol-restricted.

3. The one year general preventive medicine residency course also at the School of Aerospace Medicine allots four hours to a discussion of current nutrition topics, flight feeding, heart disease, hypoglycemia, and sources for valid nutrition information.

The availability of nutrition education for the general Air Force community is limited to:

- a. Base newspaper articles, most often during National Nutrition Week at some of those bases where a dietitian is assigned.

- b. A weekly column on various nutrition topics in the Air Force Times, which is an unofficial publication, read by many Air Force personnel and

- c. The same nutrition information, valid or misleading, available to the general population through the newspapers, periodicals, radio, and television.

## SOURCES OF NUTRITION EDUCATION RESOURCE MATERIALS

Efforts to standardize and disseminate general nutrition education materials Air Force-wide are just getting underway. To date, nutrition education materials have been developed and reproduced independently by the dietitian at a base level. The quantity and quality of these materials vary depending upon the graphics and reproduction capabilities at each base. It is possible for the dietitian to request commercial nutrition education materials, but the availability of supply funds for this purpose when charges are involved varies from base to base. As I indicated previously, one of the functions of the health education program is to provide a centralized source of health education materials. Since these materials are distributed on the basis of specific requests, the materials are not necessarily available at all Air Force bases. One of the Air Force dietitians, Captain Paula Henkel, is assigned as a technical writer at the School of Health Care Sciences. She is currently working on a project to develop a series of Air Force pamphlets which can be requested through normal Air Force publication channels. She has completed a draft of a normal nutrition booklet and plans to develop a pamphlet on fad diets with guidelines for evaluating them plus a booklet related to weight control. She is also developing booklets for therapeutic diets which are based on the soon to be published Air Force-Navy Diet Manual. This series of pamphlets will be used in all medical facilities in providing patient nutritional care.

In summary, I have discussed briefly the nutritional problems and the current efforts by the Air Force to meet these problems. The bottom line of this challenge is the development of a **comprehensive, cost-effective, and integrated Nutrition Education Program.**

## NATIONAL DIETARY GUIDELINES

Christopher Hitt

We've seen in the American population in the last two or three years a greater awareness of the food they're eating and a concern about how their diet affects their health. We would like to think that same interest also exists within the personnel in our own Armed Forces.

I think we were all asked to address one or more of four questions. Many of these questions are nutrition education questions about which some of the speakers are more knowledgeable and about which they will speak more directly. I will try to focus primarily on the first question which is, "What should be the goal of the nutrition education program for the Air Force?" In talking about that I'll go through five major areas: (1) the general population, (2) the Armed Forces in general, (3) the Air Force specifically, (4) some suggestions that I would make, and (5) the broader impact of some concerns that I have.

I would like to begin by reading a quote from Ted Cooper, Assistant Secretary for Health at the time that we first began working on the dietary goals back in 1976. He was the first witness that we had at a series of hearings called, "Diet related to killer diseases". Ted Cooper said, "In formulating health policy, I believe that we have now reached a crucial point. Many of today's health problems are caused by a variety of factors not susceptible to medical solutions or to direct intervention by the health care provider. While scientists do not agree on the specific causal relationships, evidence is mounting, and there appears to be general agreement that the kinds and amount of foods and beverages we consume and the style of living common in our generally affluent, sedentary society may be the major factors associated with the cause of cancer, cardiovascular disease, and other chronic illnesses."

About six months after that hearing, in early 1977, we released the first edition of "Dietary Goals" and, as you probably well know, it generated quite a bit of controversy. I know that part of your group met in a workshop in late 1977 at the Research and Development Association meeting at Natick, Mass. in a workshop on the Dietary Goals and its implications for the Armed Forces. We came out with the second edition late in 1977 to try to address a number of the issues that were raised about the first edition and to improve upon it. Since that time, it has continued to receive great attention, and I am constantly having to turn down speaking engagements to present and/or debate the issue.

Most recently, and most encouraging from our perspective, the American Society for Clinical Nutrition completed a one-year study which looked at many of the concerns raised in the Dietary Goals. It did not address the diet and cancer area. However, in this major report, of which I have a prepublication copy here, and which will be published in the journal soon, the society took a very cautious position on the benefit side of altering the diet.<sup>1</sup> However, from a policy perspective, the most encouraging thing was that they reaffirmed more strongly than ever that there were no apparent risks in altering the diet along the lines that were proposed in the Dietary Goals report. From a policy maker's perspective, if the Senators had had to weigh the risks and benefits of diet "A", the current American diet, versus diet "B", the Dietary Goals, they probably would not have made a decision at all. However, since they could see no risks in altering the diet, it is a very easy political decision to make.

In that context I'd like to then read Senator McGovern's foreword that he put in the second edition explaining why we did this report.

The purpose of this report is to point out that the eating patterns of this century represent as critical a public health concern as any now before us. We must acknowledge and recognize that the public is confused about what to eat to maximize health. If we as a government want to reduce health costs and maximize the quality of life for all Americans, we have an obligation to provide practical guides to the individual consumer, as well as to set national Dietary Goals for the country as a whole.

These recommendations, based on current scientific evidence, provide guidance for making personal decisions about one's diet. They are not a legislative initiative. Rather, they simply provide nutrition knowledge with which Americans can begin to take responsibility for maintaining their health and reducing their risk of illness.

What that all means, and what I would like to base the rest of my presentation on this morning, is that what we are presenting in this report is a classic public health or community health argument. An argument that says that we ought to err on the side of prudence or safety. Since we can see no apparent risks in altering the diet, and since it is a consequence which affects, depending on the illness, major segments of the population, we feel it's important to go to the public — to tell them what the situation is, to tell them about what recommendations we feel confident, and to tell them where the controversies are, that is what is known on each side of the controversy. Finally we leave it up to the individual to make a decision as to what he or she wants to do.

Now I want to turn to the second topic, the dietary goals for the Armed Forces in general. As I said, you had a workshop in 1977, and out of that workshop the suggestion was made that there should be a nutrition education program.<sup>2</sup> There were a number of questions raised, though, about the appropriateness of the dietary goals. I think that the papers presented, particularly by Colonel John Canham, represented the thinking at that time. He stated that, even though the evidence was not as good as we would like, it's a therapeutic approach. This is one of the problems we have been trying to overcome because he was ignoring, I believe, the basic tenet which I just enunciated about the prudence of health promotion and disease prevention approach to these issues.

More specifically, he said seventeen to thirty-five year olds can be maintained in good health with the current dietary pattern and physical exercise. Well, that may be true but I would say if I were in the Armed Services that that's a disservice to me as an individual, that I don't live just from seventeen to thirty-five. I would like to think that I'm going to live to be seventy or eighty, and be in very good health. What we're saying in this report and what the science is pointing towards, is that we have to look at our diet and nutrition beginning from childhood right through our lifetime. Saying that from seventeen to thirty-five years of age, if we feed you the current diet and you get plenty of exercise, during that time period you will remain healthy, says nothing about what it's doing to your body and the effects it will have upon the individual later in life. Therefore, I believe that it's an inappropriate position for the Armed Services to take.

Now it was also asserted that if they tried to implement the original dietary goals recommendations that the Armed Services would have more problems than it already has with respect to personnel not eating in the dining halls. However, he had no proof to substantiate that point, nor do those who argue generally that the American public just won't eat that way. I think nutrition educators would contend that is a bogus argument because if people understand the diet and disease relationship, then they are more than willing to consider changing their diet.

One of the things I'm constantly told is, "Why don't you talk about diet and health; why don't you talk about the positive side of it?" I respond, "Well, don't you understand that until we started talking about diet and disease, no one cared." As long as we were talking about the outdated issues of vitamin and mineral deficiencies, people just were not interested because they believed that they were getting plenty of food, vitamins, minerals and they didn't worry about these problems. They weren't associating the fact that the long-term development of many of our chronic diseases could very well be related to the way we eat.

The second paper that was presented at that 1977 workshop by Dr. Meiselman indicated that in military consumer surveys, nutrition rated low compared to personal likes, appearance, and variety in the food pattern. I don't think these factors are mutually exclusive. I don't think that nutrition has to be viewed as a negative factor which detracts from one's personal likes, and the appearance and variety of the food. Furthermore, I know that the Armed Services is very concerned about the so-called guinea pig issue, that is being labeled as a captive population for experimentation. We're very concerned about that too. However, I would submit that quite obviously the Armed Services is constantly suggesting to its personnel that they do numerous things that they might not want to do, but that are for the good of the Armed Services.

I would suggest that a more positive approach in the diet area would be to say, "Why not change your diet? This is something that is good for your health and will have an impact on the performance as members of the Armed Services." It acknowledges the value which Dr. Johanna Dwyer mentioned in the 1977 workshop, that the number one resource the Armed Services has is its personnel. Thus, I think the policy position should be to do everything possible to enhance their well-being, both during their time in the service and later in their lives.

We are constantly putting more and more money into the Defense budget which is a preventive strategy for the most part. A better diet for our Armed Service's personnel is also a preventive strategy. However, in my own mind I think of the Air Force as one of the more offensive oriented components within the Armed Services. Therefore, I believe that it is very appropriate for the Air Force to take the lead on this issue, to push forward in the nutrition education area. I think this is particularly important because you have many personnel who are career personnel. We are not talking about two and four-year recruits. We are talking about people who are spending twenty years, thirty years, maybe longer in the Air Force and thus it becomes all the more important that they understand that their dietary patterns are important to good health, physical fitness, and job effectiveness and to their functioning as highly qualified, effective personnel.

Now, there are some suggestions that I would like to make. The Air Force has a six-week menu pattern which is based on the Recommended Dietary Allowances. However, until recently no one questioned whether the RDA are sufficient to cover all the health concerns. One reason is that economically the RDA are easy because they don't infringe on anyone's turf or anyone's dollars.

The Dietary Goals, though, say that we've got to examine critically macro-nutrients, not just micro-nutrients. I think that it would be easy enough to factor into your meal patterns macro-nutrient considerations such as fat, sugar, and salt content which reflect the findings of the Dietary Goals report. I want to emphasize the word "goals". We are not saying that the percentages in that report are hard numbers. Rather, it's the direction in which we believe people should move. In fact, I would speculate that in ten or fifteen years from now we may decide that we want an even lower fat diet than is suggested in the Dietary Goals report. But at this point the 30% recommendation was what we felt was a realistic scientifically justified goal for the country.

A perfect example of this is the recent Navy program undertaken with the help of the Natick Labs to implement a pilot, fast-food dining operation. This has been a very successful effort with respect to personnel acceptance. However, it raises some troubling questions. Why in developing the program was there no concern about the amount of fat, sugar, salt, and cholesterol in that diet?

I talked to Lynne Frederick who has worked with the Armed Forces on this problem. He is equally concerned. As you may know he's making millions of dollars operating the Las Vegas, Nevada, School Lunch program. He's an embarrassment because he's literally making millions of dollars in the non-profit school lunch program. He has not had to raise the price of the school lunch in six years because he's so successful with the fast-food concept.

Recently, Senator McGovern in our food labeling hearings talked about fast foods. He said fast foods should not be considered junk foods; however, they can be improved upon. If that is the consumer's preference, then let's modify the product sufficiently so that the preference and desires are still met, but we have made a more nutritious product.

While the Navy is to be commended for trying to meet the preferences of its personnel on the Aircraft Carriers, I think that it would be within reason to factor in some of the Dietary Goals. I am speaking personally this morning, and recommend that the Air Force should adopt a policy of prudence, and, therefore, would want to initiate not only a nutrition education program, but a food management program that moves in the direction of the dietary guidelines. In addition, your nutrition education program should teach what is agreed upon and thus what you would recommend, and what is still controversial, and, therefore, what should be left up to your personnel to make a decision on as to the kind of food preferences they might want to have.

If you are not willing to adopt such a policy in the food management area, then at a minimum, you should make available alternative diets, as you are doing in some cases with the vegetarian diet and the low calorie diet, while aggressively implementing a program in nutrition education.



The current nutrition labeling initiative provides an example of what could be done by the Armed Services. Providing nutrition information to the population at large for packaged foods, fresh foods, and foods eaten away from home, particularly fast foods, is a major interest of the Nutrition Subcommittee. The subcommittee is considering including in legislation that the school lunch program, a cafeteria style program, begin to provide nutrition information about the lunch foods directly to the children as they go through the lunch line. I would think that the Armed Forces and the Air Force could try that as one of the means of providing nutrition information to their personnel.

Turning to some other concerns — first, I want to comment on obesity. I do not have the data before me, but I do know that generally there is, just as in the civilian population, a major obesity problem, particularly among career personnel, in the Armed Services. Second, even though we've had the Natick and LAIR Labs for a long time, there is still a lack of really sound nutrition data. These two factors in themselves highlight a third major concern that has been before the Congress in the last year or two which is the apparent phasing out of the nutrition function within the Armed Services. The Letterman Lab is essentially stopping its nutrition work at the end of September. There are current negotiations going on to transfer that facility to the Department of Agriculture and to let them do the Armed Services' nutrition research. Overall, this indicates a definite decline in interest which suggests that the Armed Services, instead of being ahead of the game, which is where you should be, is falling further behind.

Finally, I want to move to the broader impact of including dietary goals considerations in Armed Forces food policy. There is a whole range of points of which I will list three quickly. One is simple procurement policies. We know that the USDA, for example, in the school lunch program feeding 25 to 27 million kids a day, has a major impact on food purchasing in the country. And more importantly, USDA is beginning to affect the dietary patterns of that age group. We have had the RDA as part of the criteria for the so-called Type "A" school lunch for years. The current administration is considering a reduction in the fat, salt, and sugar content of that menu pattern. They haven't gone so far as to include a dietary goals type of recommendation in conjunction with the RDA, but they are examining options that move in that direction. I think that the Armed Forces obviously could have an equally significant impact on what we are producing in this country by altering its procurement policies.

Secondly, you do have a significant number of families, I believe it is as high as 6 to 7 million dependents. Thus, you could begin to have an impact on the eating patterns of the men and women who are in the services, as well as of their families. Also, this would have a ripple effect with respect to their friends because people learn from their peers, and so in that way it would be an ongoing nutrition education effort.

Finally, the Armed Services, like the nation as a whole, is concerned about rising medical care costs. If we are correct that the apparent cause and effect relationship between our diet and our killer diseases does in fact exist, then our medical care costs can be dramatically reduced. If you could begin with your career personnel to alter their morbidity and mortality patterns, then the Armed Services could reap the benefits of a dramatic decrease in health care costs.

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## NUTRITIONAL STATUS, SURVEILLANCE, AND INTERVENTION

H.E. Sauberlich, M.J. Kretsch and D.D. Schnakenberg

In 1969, the White House Conference on Food, Nutrition, and Health recognized that in part nutritional problems in the United States were the lack of knowledge and information on nutrition rather than a lack of available nutrients. The report also stated that, "The objective of nutrition education is to promote optimum health through food and thus contribute to an individual's potential for achieving his life's goals. Sound nutrition education should enable each individual, throughout his life, to make wise decisions about his food choices."

The Government Accounting Office stated in their report<sup>1</sup> developed in 1977 on **Federal Human Nutrition Research** that "the ultimate value of food is realized only when it is consumed. Nutrition education is thus of high priority because the public must be provided the information that will promote the interest in nutrition required to encourage good nutrition practices." The report also stated that nutrition surveillance and monitoring are essential for establishing criteria for programs of nutrition for health, food safety, and nutrition education, and for measuring the effectiveness of implemented programs.

In contrast, there are those who believe we may be confusing nutrition education with behavior. Such proponents contend that Americans know what is good for them to eat but do not always act on the basis of their knowledge. If so, a more subtle educational approach may be necessary to alter their nutritional habits. However, surveys have reported that over 85% of the adults in the American population desire more information about nutrition. In addition, the current unprecedented interest in fitness emphasizes the need for proper food and nutrition education efforts. Such efforts can guide the individual to food habits that will provide his/her nutritional needs in preference to his/her wants.

In the past, military nutrition interests have focused primarily on the effects of nutrition on physical performance of its personnel. The importance of nutrition as a form of preventive medicine has been often overlooked. Interactions of nutrition in infection, environment, and in recovery from surgery or trauma have received limited attention. Obesity has received some attention because of its potential impairment of physical performance by military personnel. The possible association of diet to coronary heart disease, dental caries, diabetes mellitus, arteriosclerosis, stroke, hypertension, colonic cancer, or liver cirrhosis, and other conditions has been treated as a problem for civilian consideration.

Although the military services have nutritional problems in common with the civilian population, unique factors do exist! A high proportion of military personnel are young adult males. The number of young women entering the services is increasing. Personnel may serve in harsh climates, stressful situations, or special environments, such as on a submarine, in an aircraft, or on board an aircraft carrier. Many of these situations may require special nutritional considerations that can impact on the type of nutrition education required.

Although individuals may be knowledgeable in sound nutritional principles and willing, if not anxious, to practice healthful dietary habits, the foods and food services available to military personnel may not always be compatible with such interests. At times food service

systems may be concerned with cost effectiveness without involving nutritional considerations. Frequently, food service personnel have had little, if any, nutrition education. Cultural or ethnic food patterns are often overlooked.

As in the civilian population, increased numbers of the military personnel are occupied in less physical demanding job positions. With the resulting reduced caloric requirements, the need to make nutritionally sound food choices becomes even more essential. Selection of foods with a higher nutrient density is important in order to provide an adequate intake of the essential nutrients. Recent changes in military feeding systems have provided the individual with an increased freedom in making food choices. In some instances this has resulted in reduced participation of personnel in the military dining facilities, but with a concomitant increased utilization of restaurants, snack bars, fast-food outlets, canteens, and coin food dispensers.

Although the Military Services screen personnel upon entry for medical disorders, clinical manifestations of conditions that may be nutritionally associated usually do not appear until years later in the service. Clinical, dietary, anthropometric, and biochemical surveillance and monitoring techniques can detect nutritional problem areas or identify individuals with special concerns.<sup>2-4</sup> These techniques have been applied effectively to identify problems existing within various military populations. For example, dietary surveys of the military feeding systems have often revealed that the diets available and consumed by the personnel are rich in calories and high in total fat as well as high in saturated fat and cholesterol. Inadequate intakes have been observed for some nutrients such as iron, vitamins A and C, riboflavin, and folacin.

Obesity may be readily evaluated through the use of anthropometric measurements. Height, weight, arm circumference, and skin-fold measurements are commonly utilized and provide an indirect estimate of the amount of body fat. More precise information may be obtained by body composition evaluations. This requires whole body potassium-40 counting, water displacement measurements, and body water compartment estimates.

Obesity exists within the military ranks. For example, at Twenty Nine Palms Marine Base a significant number of both male and female Marines were overweight when weight for height standards were applied (Table 1). In an evaluation conducted in 1978, over 10 percent of the males and over 30 percent of the females studied were judged overweight.

TABLE 1

Marine Corps Base: Twenty Nine Palms, CA

## Anthropometry Measurements

Parameter	RIK — Males		RIK — Females	
	Mar 77	Oct—Nov 78	Mar 77	Oct—Nov 78
No. Studied	109	120	36	44
Age (yrs)	21.6	21.2	20.9	21.7
Height (cm)	177.2	174.9	165.6	165.2
Weight (kg)	73.1	72.1	58.5	61.0
Weight for Height (%)				
Underweight	0	0	0	6.8
Within Standards	94.5	89.2	88.9	61.4
Overweight	5.5	10.8	11.1	31.8

RIK = Ration-In-Kind status.

Similar obesity problems were observed among the sailors on board the aircraft carrier USS Saratoga. In two studies conducted on 118 men, about 16 percent were classified as overweight (Tables 2—4). With increased weight, an increase in both weight of fat and percent

TABLE 2

## Anthropometry of USS Saratoga Sailors

	Date of Study	
	Nov 1978	Mar 1979
Body Weight (kg)	75.0 ± 12.2*	74.6 ± 12.0
Body Fat (%)**	19.6 ± 4.4	19.5 ± 4.0
Body Fat (kg)	15.1 ± 5.5	14.8 ± 5.1
Height (cm)	175.7 ± 7.2	175.7 ± 7.2
Age (yrs)	23.3 ± 4.7	23.6 ± 4.7
No. Subjects Studied	118	118
No. Overweight†	20 (16.9%)	16 (13.6%)

\*Mean ± S.D.

\*\*Estimated by the Durnin-Womersley method using age and sum of 4 skinfolds.

†Per BUPERINST 6110.2A, 17 June, 1976.

of body fat were observed as determined by skinfold measurements (Tables 3 and 4). Thus for the overweight personnel, approximately 25 percent of their weight was fat (Table 3).

**TABLE 3**  
**Anthropometry of USS Saratoga Sailors**  
**Categorized According to Weight for Height Standards**

	1st & 2nd Quartile	Weight for Height Standards* 3rd Quartile	4th Quartile	Overweight
No. of Subjects	43	38	17	20
Age (yrs) Nov 78	22.4	22.6	24.4	25.6
Height (cm) Nov 78	175.6	174.7	176.1	177.5
Body Weight (kg) Nov 78	65.8	72.8	81.7	93.3
Mar 79	66.1	72.2	80.8	92.4
% Body Fat** Nov 78	16.5	19.0	22.1	25.4
Mar 79	17.0	18.8	21.6	24.4

\*Per BUPERINST 6110.2A, 17 Jun 1976, Quartiles found by subdividing minimum and maximum weight for a given height into 4 narrow ranges (quartiles).

\*\*Estimated by the Durnin-Womersley method using age and sum of 4 skinfolds.

This is reflected in the increase in skinfold measurements (Table 4).

**TABLE 4**  
**Anthropometry of USS Saratoga Sailors**  
**Categorized According to Weight for Height Standards**

Skinfold Measurements	1st & 2nd Quartile	Weight for Height Standards* 3rd Quartile	4th Quartile	Overweight
No. of Subjects	43	38	17	20
Bicep (mm) Nov 78	4.4	5.6	6.6	9.2
Mar 79	4.4	5.1	6.7	8.5
Tricep (mm) Nov 78	9.4	10.8	13.4	15.8
Mar 79	9.4	10.2	12.6	14.2
Scapula (mm) Nov 78	11.0	12.7	16.6	23.4
Mar 79	11.4	12.5	17.1	21.6
Supra-iliac (mm) Nov 78	16.9	21.9	28.2	32.7
Mar 79	18.3	21.8	26.6	30.6

\*Per BUPERINST 6110.2A, 17 Jun 1976, Quartiles formed by subdividing minimum and maximum weight for a given height into 4 narrow ranges (quartiles).

Information on diets and dietary intakes can be useful in nutritional assessment and surveillance. Various approaches may be used to obtain this information: (a) dietary recalls, (b) dietary interviews, (c) food intake measurements, (d) food frequency determinations, (e) food preferences, (f) food resources, (g) food nutrient analyses, and (h) nutrient intake calculations.

Dietary intake information has been obtained on various military populations. Studies conducted at the Marine Corps Base, Twenty Nine Palms, California, may be used as an example. Meal consumption patterns of the Marine personnel are presented in Table 5. Both males and females consume an average of two meals per day. It should be noted that only 50

**TABLE 5**

**Marine Corps Base: Twenty Nine Palms, CA  
Meal Consumption Patterns**

	RIK – Males		RIK – Females	
	Mar 77	Oct–Nov 78	Mar 77	Oct–Nov 78
Total Meals Per Day	2.09	2.00	2.11	1.74
Percent Average Daily Energy From:				
Dining Halls	51.2	46.3	24.0	20.8
Home	18.9	13.2	42.0	31.2
Restaurants	18.6	22.9	21.0	26.6
Vendors	11.4	17.5	13.0	21.4
Percent Average Daily Energy From:				
Meals	79.6	75.4	77.4	73.1
Snacks	20.3	24.6	22.6	26.9
No. of Subjects	109	120	36	44

percent of the energy for males and 24 percent of the energy for the females were obtained from the dining halls. Homes, restaurants, and vendors supplied the remainder. Approximately 25 percent of the energy was obtained from snacks. Energy intakes ranged from 2800 to 3300 kcalories for the Ration-In-Kind male Marines (Tables 6 and 7), an average of 38 percent

TABLE 6

Average Total Daily Dietary Intake  
By RIK — Males  
(Marine Corps Base, Twenty Nine Palms, CA)

	C & E and H & S Personnel		Force Troops	
	1977	1978	1977	1978
Energy (kcal)	3321	2865	2827	2800
Protein (g)	116	101	99	105
Fat (g)	142	119	116	119
Cholesterol (mg)	667	497	570	523
Carbohydrate (g)	344	301	283	293
Alcohol (g)	27	31	33	23
Crude Fiber (g)	4.0	3.1	3.4	3.1
Calcium (mg)	1469	1104	1084	1184
Phosphorus (mg)	2126	1777	1732	1862
Iron (mg)	16.3	16.8	14.0	16.6

TABLE 7

Average Daily Intakes of Calories,  
Fat, Cholesterol, and Protein  
(Marine Corps Base, Twenty Nine Palms, CA)

	RIK — Males	
	1977	1978
Energy (kcal)	3085 ± 815	2831 ± 770
Fat Calories (%)	37.9 ± 6.8	37.8 ± 6.2
Cholesterol (mg)	621 ± 284	511 ± 224
Animal Fat (%)	65.4 ± 9.6	65.1 ± 10.4
Plant Fat (%)	34.1 ± 9.6	34.5 ± 10.3
Fish Fat (%)	0.4 ± 0.8	0.4 ± 1.0
Protein Calories (%)	14.1 ± 2.6	14.6 ± 2.4
Animal/Fish Protein (%)	76.6 ± 6.5	77.1 ± 6.6
Plant Protein (%)	23.4 ± 6.5	22.9 ± 6.6
No. of Subjects	109	120



of the calories came from fat with 65 percent provided from animal fat. From 500 to 660 mg of cholesterol were ingested. This is similar to the cholesterol intakes estimated for personnel on the USS Saratoga (Table 8). Intakes of crude fiber were estimated to be relatively low.

TABLE 8

Average Daily Cholesterol Intakes  
Personnel on USS Saratoga

Cholesterol Intake mg/day	% of Subjects
< 300	9.3 (14/150)*
> 500	52.7 (79/150)
>1000	5.3 (8/150)

\*Number out of 150 enlisted sailors studied for 7 consecutive days during November 1978.

Intakes of vitamin A were low for both male and female Marine personnel (Figures 1 and 2). Studies conducted in 1977 and 1978 both indicated that over 50 percent of the personnel studied had low intakes of vitamin A. The low intakes of vitamin A reflected the low density of the vitamin in the meals consumed in the average dining hall meal (Figures 3 and 4). Iron intakes by the female Marines were also below recommended standards (Figures 5 and 6). Over 60 percent of the females had low daily intakes of iron.

The Food and Nutrition Board of the National Academy of Sciences has recently established recommended dietary allowances for a number of trace elements for the human. Military nutrition surveys such as those conducted at the Naval Air Station, Alameda, California, have permitted an initial estimate of the adequacy of military eating patterns in providing these nutrients. Results presented in Table 9 indicate that the intakes of zinc and manganese are generally adequate, while those of copper may be somewhat marginal. In order to assess the intakes of these trace elements, foods consumed were sampled and analyzed for these nutrients. Such analytical information is placed in a nutrient factor file. Effective dietary assessment procedures are dependent upon the availability of a computer file that contains complete food analyses on all foods consumed.

Biochemical measurements serve as an objective assessment of nutritional status. Numerous biochemical techniques are available for use in evaluating an individual's nutritional status with regard to the essential nutrients. The use of these techniques requires the inconvenience of obtaining and handling blood and urine specimens. Nevertheless, the measurements may provide information as to an individual's present, or recent, and sometimes long-range nutritional status.

Military nutrition surveillance and evaluation studies commonly include biochemical measurements. Such measurements were included in nutritional studies conducted on the Marine personnel at Twenty Nine Palms, California. The low serum vitamin A levels observed in a

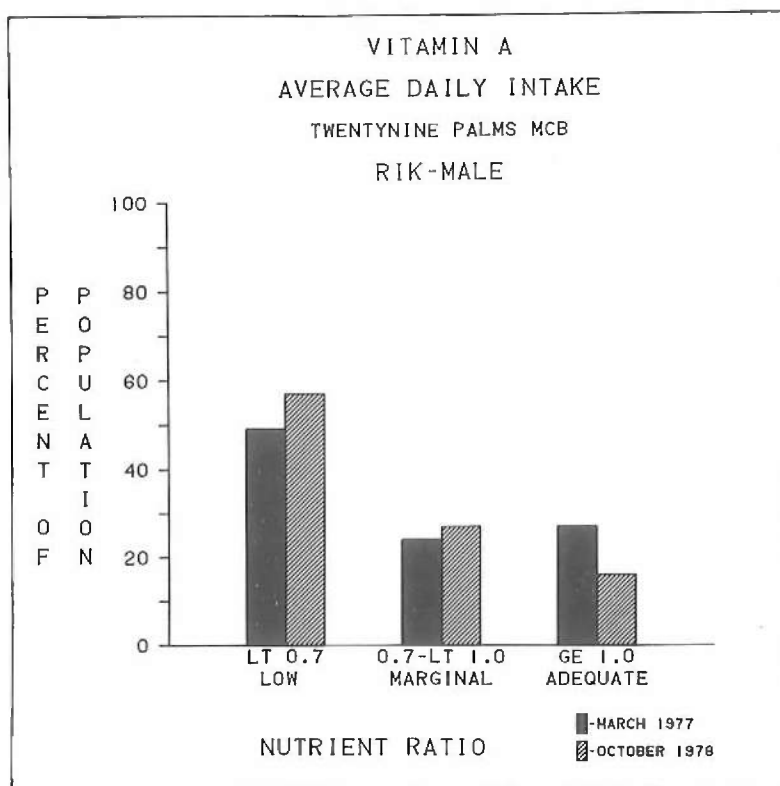


Figure 1: Vitamin A intakes at Twenty Nine Palms Marine Corps Base, California, by male personnel in Ration-In-Kind status. Surveys conducted in March, 1977 and October, 1978.

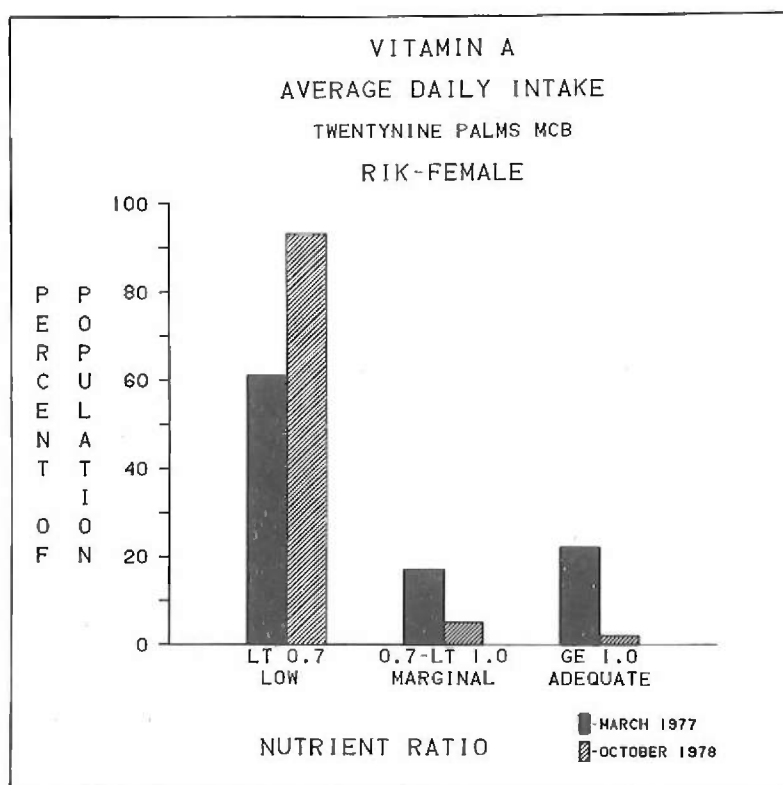


Figure 2: Vitamin A intakes at Twenty Nine Palms Marine Corps Base, California, by female personnel in Ration-In-Kind status. Surveys conducted in March, 1977 and October, 1978.

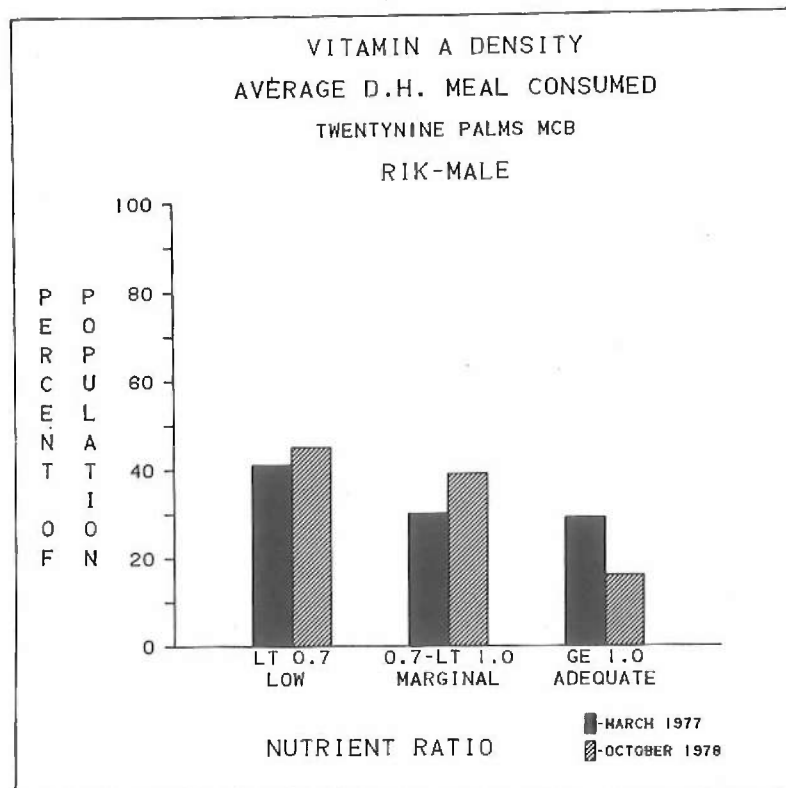


Figure 3: Vitamin A density in the average dining hall meal consumed by male personnel at Twenty Nine Palms Marine Corps Base, California.

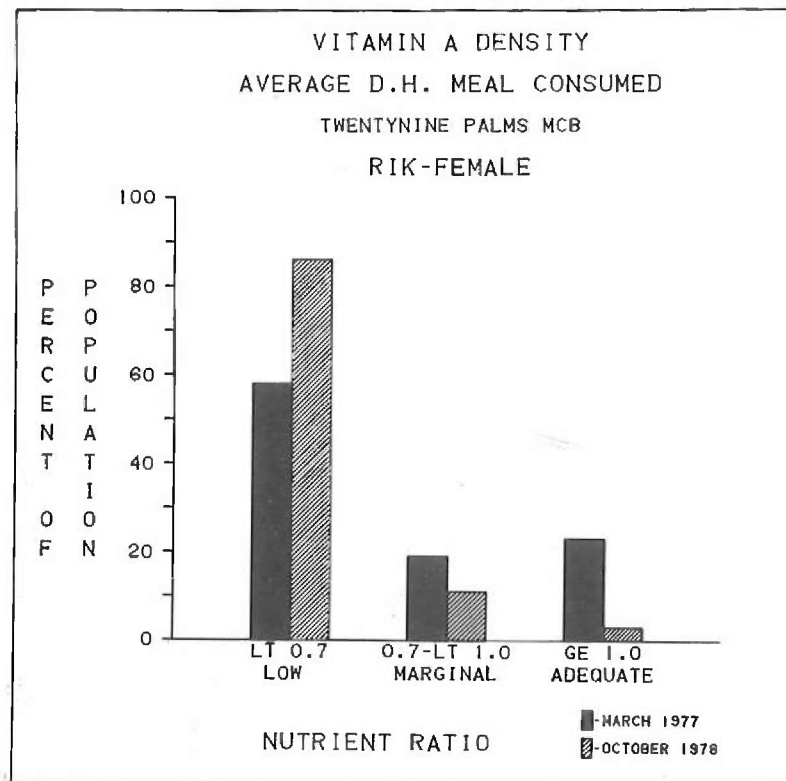


Figure 4: Vitamin A density in the average dining hall meal consumed by female personnel at Twenty Nine Palms Marine Corps Base, California.

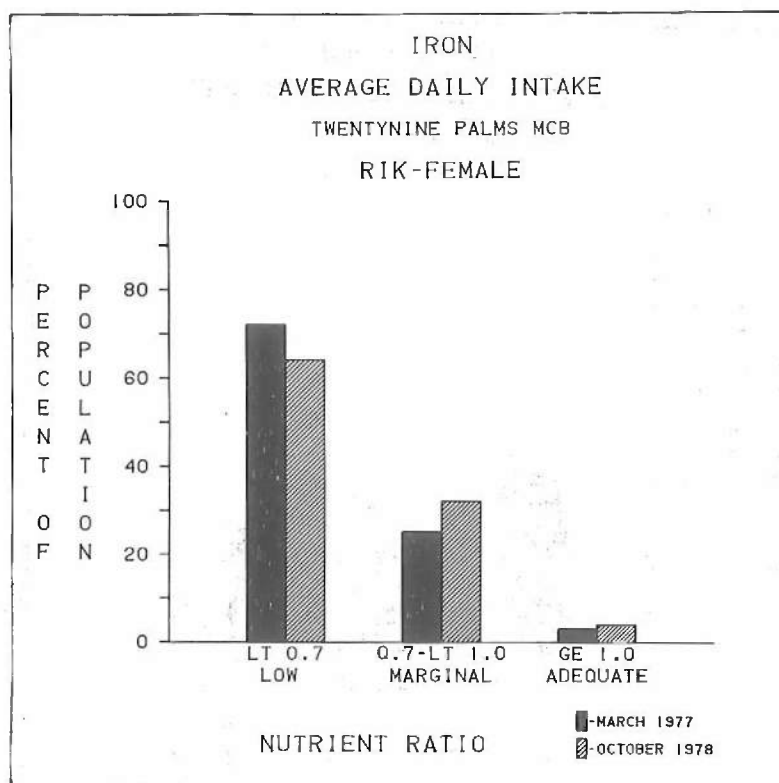


Figure 5: Iron intakes at Twenty Nine Palms Marine Corps Base, California, by female personnel in Ration-In-Kind status. Surveys conducted in March, 1977 and October, 1978.

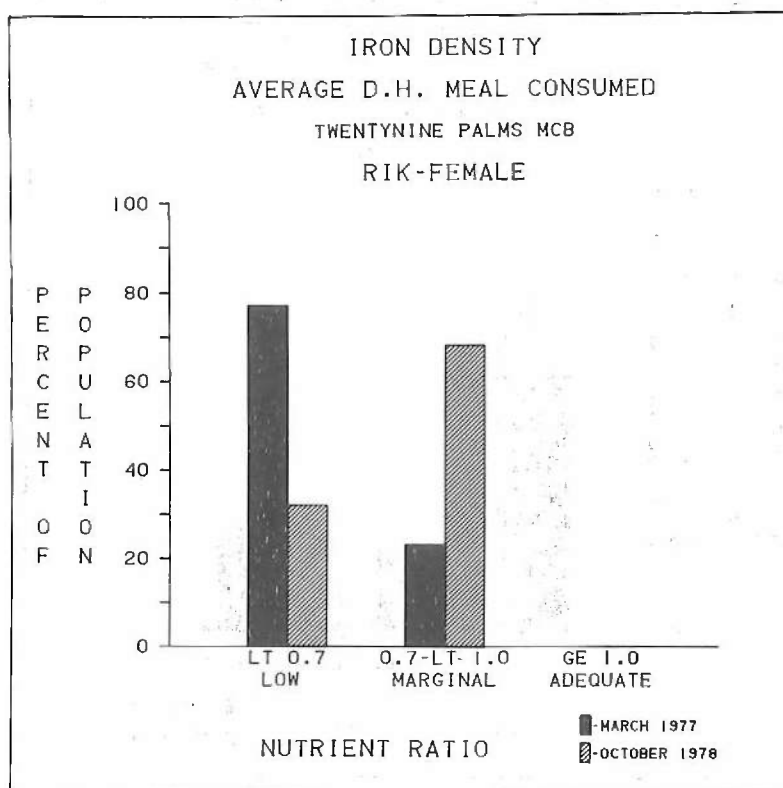


Figure 6: Iron density in the average dining hall meal consumed by female personnel at Twenty Nine Palms Marine Corps Base, California.

considerable number of subjects studied corroborated the low vitamin A consumptions noted by dietary interviews (Figures 7 and 8). Iron nutritional status was also evaluated through the use of several biochemical measurements. Serum ferritin levels, for example, provide an index of iron stores in the body. The low dietary intakes of iron by the female Marines were reflected in exceedingly low serum ferritin levels in 19 to 26 percent of the individuals studied (Table 10). These low serum ferritin levels indicate poor body iron stores.

TABLE 9

Trace Element Intake  
(Alameda Naval Air Station, CA: 1975)

Subject*	Copper (mg/day)	Manganese (mg/day)	Zinc (mg/day)
A	2.1 ± 2.2	1.9 ± 0.4	26.2 ± 12.0
B	1.6 ± 0.5	2.1 ± 0.8	15.0 ± 3.9
C	1.4 ± 0.5	1.7 ± 0.5	20.4 ± 8.7
D	2.1 ± 0.5	4.2 ± 1.6	21.7 ± 8.4
E	1.4 ± 0.6	2.2 ± 1.0	17.4 ± 6.2
Mean	1.7 ± 1.0	2.5 ± 1.4	20.3 ± 8.8
RDA	(2-5)	(2.5-5)	(15)

\*Observations over period of 9-14 days.

TABLE 10

Serum Ferritin Levels  
Marine Corps Base, Twenty Nine Palms, CA

Study	Deficient (≤ 10 mg/ml)		Low (10-20 ng/ml)		Acceptable (> 20 ng/ml)	
	No.	%	No.	%	No.	%
March, 1977						
Male (310)*	4	1.3	21	6.8	285	91.9
Female (42)	11	26.2	15	35.7	16	38.1
November, 1978						
Male (235)	2	0.8	15	6.4	218	92.8
Female (47)	9	19.1	18	38.3	20	42.6

\*( ) = Total number studied.

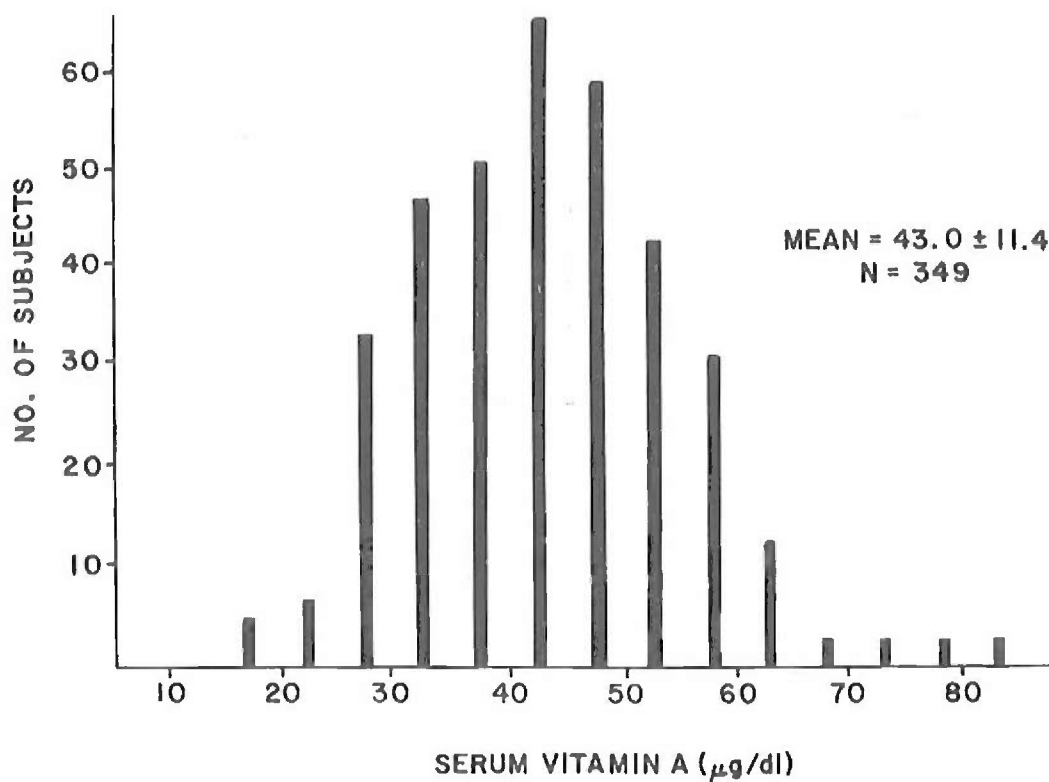


Figure 7: Serum vitamin A levels in male and female personnel at Twenty Nine Palms Marine Corps Base, California. Survey conducted in March, 1977.

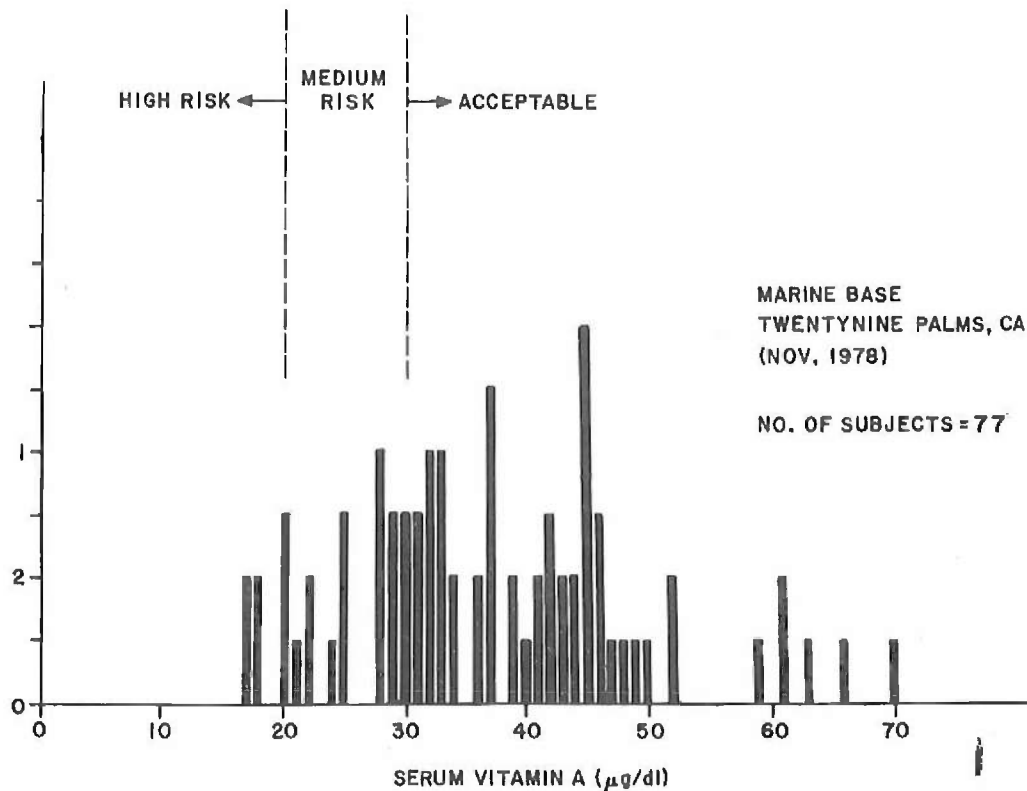


Figure 8: Serum vitamin A levels in male and female personnel at Twenty Nine Palms Marine Corps Base, California. Survey conducted in October 1978.

The Dietary Goals for the United States of the Select Committee on Nutrition and Human Needs has recommended that the consumption of cholesterol should be reduced to about 300 mg per day.<sup>5</sup> As noted above, cholesterol intakes by military personnel exceeded this goal. Consequently, serum cholesterol levels are often determined during the course of military nutrition studies. Table 11 illustrates the distribution of serum cholesterol levels observed in male subjects at Twenty Nine Palms Marine Base. The levels observed in the military personnel were comparable to those reported for the United States Health and Nutrition Evaluation Surveys. Nevertheless, 6 percent of the Marine personnel had serum cholesterol levels of 240 mg/dl or higher, — levels considered elevated for males of the age studied.

**TABLE 11**  
**Twenty Nine Palms Marine Base: Males (1977)**

Cholesterol Level mg/dl	Marine Subjects		HANES SURVEY*
	No.	Incidence (%)	Incidence (%)
0—100	0	0	0.1
100—120	7	2.2	1.0
120—140	27	8.7	5.6
140—160	46	14.7	16.4
160—180	72	23.1	23.5
180—200	64	20.5	23.1
200—220	43	13.8	13.4
220—240	34	10.9	7.4
240—260	13	4.2	5.5
260—280	5	1.6	2.0
280—300	1	0.3	0.8
> 300	0	0	1.2
No. Studied:	312		
Mean ± S.D.		179 ± 31	187 ± 37

\*United States, 1971—1974: Males, 18—24 yrs of age.

The instances described are but a few examples of how biochemical techniques can be used to identify nutritional problems in the military. Procedures are available for the nutritional assessment of each of the vitamins or minerals as well as for protein or lipids. Biochemical measurements along with dietary and anthropometric information and physical examinations can serve as means of monitoring the effectiveness of nutrition intervention programs.

Recently the Office of Technology Assessment of the U.S. Congress listed seven priorities to guide human nutrition research: (1) Role of diet in the prevention of chronic disease and obesity; (2) Role of nutrition in the treatment of disease and support of therapy; (3) Requirements for essential nutrients; (4) Nutrition education and consumer information;

(5) Nutritional aspects of food science and food safety; (6) Monitoring nutritional status; and (7) Nutrition policy and management. Aspects of nutritional assessment will be essential for the successful attainment of these goals.

In summary, nutrition assessment, surveillance, and monitoring are essential for (1) identifying problems, for (2) establishing criteria for programs of nutrition for health, food safety, and nutrition education, and for (3) measuring the effectiveness of implemented programs.

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## DISCUSSION

**Altschul:** I'd like to suggest that somebody rebut, if possible, this 4600 calorie level. Is that rebuttable or not?

**Richmond:** Well, if it isn't rebuttable, is it explainable?

**Gotshall:** I think it's explainable because the world wide menu that the Air Force publishes includes a variety of entrees of which there are 3 or 4 with the selection of vegetables, salads and desserts, and the information that is provided to us is that no one eats everything that's on that menu! The daily consumption of calories is not controlled by the items on that menu. The fact that the menu is published and may contain from 4000 to 4600 calories does not mean that the individual is consuming that many calories. Our information tells us that most people, even though they are entitled to three meals a day in the dining facilities, do not have to eat three meals a day; it's more likely they'll only eat two meals a day in the dining facilities. We have no control over the calories they consume outside the dining facilities. So in answer to that, I don't think that it's fair to criticize at that level because the individuals are not consuming that amount.

**Richmond:** But still, you offer that level though. Now, is it necessary to offer 4600 calories a day or could you offer 3000 calories a day?

**Gotshall:** We offer it on the basis of a choice, so we have no way of knowing. That's an average number of calories that is taken from that menu so there's no way of knowing what the individual will take. There are three or four entrees and they may take an entree, they may take a vegetable, they may take a salad and that may be it, so you really don't know what they are going to consume.

**Richmond:** If they consume the full menu, the entree, the salad, the main course and the dessert, what have you? It's got to be, if they eat that three times a day, they are going to have 4600 calories. Right?

**Gotshall:** It is possible.

**Richmond:** In other words, let me just throw out something — serving hash browned potatoes with breakfast! It's probably not necessary. That type of thing.

**Gotshall:** I think you've hit on it. I think the reason for this whole group meeting is to share information. You've said it, we've all said it — that the person comes into the dining facilities with established eating habits. This has been proven to us. That is, if we don't put certain things out there on the line, whether or not as a dietitian I think they are good or bad, the person may not return to the dining hall. So what have we accomplished? We must recognize the fact that we have a certain responsibility to that individual, namely, his/her entitlement to three meals a day.

**Richmond:** Well, his entitlement is three meals a day, but his entitlement is also that we in the leadership area provide him with the most helpful diet possible. Now, serving three meals a day is healthful; in fact, I always insist on eating three meals a day. Three meals a day! Everyone should eat three meals a day: breakfast, lunch and dinner. People shouldn't eat snacks; people shouldn't eat things before or after a meal, but three meals a day, I think, are very, very healthful. Three well-balanced meals, but certainly the total of those meals should be nowhere near 4600 calories. In other words, your dietitians should have more of an idea about eliminating the foods that are high in fat.

**Gotshall:** The point that I'm trying to make is that the purpose of this whole session here is very important, because we do have a volunteer Military Forces. So it's even beyond control at this point or anybody else's control, since the individual soldier has now decided upon the quality of life style that he or she wants, and this is what we are trying to provide them.

**Wiggins:** Your comment on the 4600 calories, Congressman, I think the young lady over there was trying to make it clear, and believe me I'm not trying to put holes in anything you said. There are 4600 calories listed; however, we are trying to educate these young men and ladies who come through the door to only take 2500 or 3000 calories in a day's time. Now, we have Chicken a la King on the menu and, why does it sell? Because people like Chicken a la King. They won't eat dry, baked chicken. You, also in your previous statement, made a comment that we need to increase our variety. Well, Chicken a la King and other popular dishes are a doggone cheap way to serve a cheap meal and get people into our dining halls.

**Altschul:** I think that the points to be made haven't been. I think one of the questions that could be raised is, what could you put on the menu that says something to these people about how to eat wisely?

**Richmond:** Certainly, one thing you could do which I'm sure you don't do is put the calorie content on the foods. Do you? Is there a calorie count next to every food as the people go through the mess line?

**Wiggins:** In my establishment, there is.

**Richmond:** Let's face it, in the average dining hall, I bet that you don't have any type of nutrition education message on the cafeteria line. You could very easily have some calorie content signs which would help you because, even the average young person, if he/she is confronted with something that says 500 calories and something that says 200 calories, he/she might very well take the 200 calorie item if he/she thinks they are gaining a little weight. Isn't there any way that this great group of dietitians and nutrition experts could somehow provide us with the caloric content of every product in any mess hall or dining facility?

**Dickerson:** In answer to your question about calories, we have provided this information to individuals to be used as they go through the cafeteria line. Our service people are told to put it alongside the menu so that you could look at this, but you still can't twist the man's arm to read on and make up the total calories for that day. This doesn't necessarily give

her/him the critical basic information needed — why we should choose between one entree and another.

**Richmond:** Just a little simple card over that product in the cafeteria line with calories, starch, sugar, and salt would be enormously helpful.

**Dickerson:** That's right. We have been working on this for years and have been providing it.

**Richmond:** I've never seen anything of this sort in any dining hall that I've ever been in.

**Dickerson:** Well, I'm sorry about that.

**Richmond:** Of course, I've never seen one in any high school either. My subcommittee has jurisdiction over all the public feeding programs in the whole country including school lunches. And I've tried to do the same identical thing in high schools where children have freedom of choice in their high school cafeterias. I'd like a little sign over every product telling people simply what's in that product. How many calories, how much sugar, how much fat, how much salt? And that's the easiest way to educate people.

**Anderson:** I couldn't agree with you more. You pointed out as that, such a program must be a comprehensive program and begin when you are very young, and if you're starting at high school, that's better than starting with the military.

**McCarthy:** You talked about feeding men/women baked fish and baked chicken and that is really kind of eye wash because, when it gets to the dining facility, the cook is going to put it into the deep fat fryer! So we have not only the patron coming into the dining facility to educate, we also have to educate food service personnel, the people preparing the meals.

**Richmond:** I'm sure every branch of the service has cook's school. Right? Wouldn't that be the place to teach nutrition education first? What type of nutrition education is given at our cook's schools all over the country?

**McCarthy:** There are about two hours in the whole course, devoted to nutrition education.

**Richmond:** That's the most important place we can do a lot of good — if we could teach the cooks themselves not to put that chicken in the deep fat fryer and to fry as little as possible.

**McCormick:** We haven't started the pilot program but we've been asked to do one by General Brooks. One of the things he said was, at least put information cards out on the serving line. Put a blue card out for low calorie; a red card out for medium or high. However, in the course of getting the information together, I was amazed to think that our cooks are getting a food technician course which is a very advanced course. In that course, they don't get instructed in the basic four food groups; no nutrition is taught. The advanced course includes 18 hours for menu planning and 2 hours of that is for nutrition out of a total of 344 hours.

**Richmond:** That seems to be the place to do the major work and add some nutrition education to all the cook's schools' courses, right?

**Wiggins:** In Charleston, South Carolina, we have a pilot program to retrain the already trained Navy cooks. That's one reason I'm here today to see what's going to be put out of value to the Navy cooks. We send our dietitians aboard the ship to assess the capabilities of that ship and sit down for three, four, or close to a six-hour program divided into three days, two hours each with the cooks. They go over their menus with the dietitians to assess the capabilities of the kitchen and to be able to let the shipboard cooks themselves come up with a viable menu which is low in calories, low in fats, etc. So the program is underway for the Navy.

**Richmond:** Right now, what are your average daily calories offered?

**Wiggins:** It's almost impossible to say what is the average, probably around 6000 calories. You have to provide a choice for these people. So, you have to educate people about how to eat the number of calories required to perform and maintain their job. You might have six to nine thousand calories available to them in a day. It's just a matter of getting them to only take so many of the calories that are available to them.

**Unidentified:** I guess there is a misconception about what the eating of the 4600 is. The 4600 is, as I understand it — let me get it straight — a total of what is available from which they choose a smaller number. Is that right?

**Richmond:** No. There are many, many more selections than 4600 calories; 4600 calories would be the average that a person could select. I'd like to bring that average down by about 1000 calories.

**Jacobs:** I think we all agree that it's a matter of education. You've made some very good suggestions in terms of such a program being a Department of Defense program. It should be a program that expands over the whole life span of a serviceman. If you ask who has the responsibility for nutrition education, The Surgeon General has in one sense. However, within The Surgeon General's Office, nutrition education has to be less important than infectious diseases and other kinds of medical problems.

**Richmond:** When we find that half the diseases in the United States are dietary related diseases, it seems to me we ought to get to the cause of half the diseases by straightening out our diets.

**Jacobs:** I agree but, in order to go towards the kind of things that you want and I've written about and other people have written about trying to stimulate thought, you have to kind of change the administrative ways, so that nutrition education programs can be effective. You have suggested at different times that there should be a project manager at the DoD level to get things done. There has to be someone at that level in order to implement these ideas.

**Shiller:** It would seem that the comments you're making involve a lot of people, the food services, the dietitians, and you're involved in logistics: A lot of this discussion is about logistics, in terms of how to get the meals out and what foods are nutritious. It would seem to me one of the basic problems that we should be thinking about is how to get the people who should be in church, and usually aren't, into church. The people who are interested in maintaining their health, maintaining a certain level of diet, health and nutrition, they're going to go through the line, and before they come into the mess halls or dining halls, they know what's healthy. I agree with the fact that we need to have better education, but I just want to throw a question back at you, my Congressman Richmond. There is a tremendous amount of health education going on right now. Albeit, it may be fragmented, we're trying to pull our acts together, but there is a lot of good health education going on right now, in all of the Military Services. However, I think the biggest question we have right now in health education is traditionally what we've had in the past and is not health education. I'm not talking about diet and value in nutrition, I'm talking about the whole spectrum of health information systems. We're looking at a health education system which we are planning for the Air Force right now. We are looking also at the need for an evaluatory system from which we will get feedback, namely if the person or patient is really learning something. My question about the Cincinnati Program is, has anybody evaluated all this media material they put out and are they reaching the people? Because what we want to know is how can we actually get people to modify their behavior? We can put out all kinds of information, but how do we know if they are modifying their behavior?

**Richmond:** Well, the Cincinnati group, I think, testified for about an hour or two before I attended the meeting. It was absolutely fascinating that they had a whole panel of people from Cincinnati. They had been evaluating their programs and, in truth, they had been reducing people's weight and getting people more health and nutrition conscious. Certainly, a comprehensive nutrition education program would make everyone a lot healthier. What are we doing in the Armed Services about overweight people? Are they told to lose weight? Are they put on diets? What do we do?

**Shiller:** We have developed certain weight standards. People must meet certain limits and they work very closely with the dietitians, the hospitals and the clinics to reach certain goals of maximum efficiency in their jobs. The Air Force is, obviously, familiar with the statistics on coronary disease and that being overweight contributes to this disease. What I am saying, getting back to my original point and not being defensive about it, is that we are doing a great job on health education right now. It would behoove us, obviously, to tie our acts closer together so that there would be less duplication of effort.

**Richmond:** Are you doing the same in the Navy?

**Unidentified:** I wish I could speak for the whole Navy.

**Richmond:** Are you doing anything for the overweight?

**Unidentified:** We do have an overweight program. Dick and I were talking about it today. It's on paper and is called Ship Shape.

Sauberlich: One of the problems on our studies on the U.S.S. Saratoga\* was that many of the sailors did not have access to the regular feeding lines. In other words, they had to wait in long, long lines, and so many of them just sort of gave up and went to what they call hash houses. They started doing snacking and one aspect was to try to improve that by developing a better meal pattern or eating pattern. They were forced into these patterns not by choice but because of the feeding systems. Sometimes the feeding system itself does not always lend itself to what is desirable. Secondly, they did not always have access to certain foods that they would like such as beverages. Milk is highly preferred and desired and they did not have access to it. Supplies run out very quickly. Then there were certain other food items that were not fortified. They had some beverages on board that did not contain vitamin C and it would be a matter of a very small cost to add them but even that little cost was questioned and so ascorbic acid was not added to the beverages. Likewise, vitamin A was not accessible in any great amount and could be introduced via fortification of this vitamin in milkshakes, for example. Vitamins A and C can be placed into their beverages, these two nutritional problems could be corrected very readily, cheaply, and yet have no impact as far as bringing a change in food habits. That is, they would get the food nutrients even though they didn't always have access to the fresh milk.

Dwyer: Would you please tell us the rationale for development of the Military Services' weight standards?

Cutting: Oh, I can discuss it on general principles. Basically, there are two sets of standards within the Army. One set is for entrance into active duty and then there is another set for retention in active duty status. Once an individual qualifies for entrance for the first set then he shifts over to the second set of standards. Right now, the retention standards are more stringent than are the entrance standards which creates an interesting dilemma.

Anderson: I would like to read a very brief quote I have been carrying around with me here, and get your response to it. "The death rate for Americans has dropped to the lowest level ever recorded. The death rate was 6.3 persons/thousand population in 1976 down from 11.3% in 1970." To what do you attribute this dramatic decrease in the death rate in respect to the remarks you made earlier?

Hitt: We know we are doing something right. In fact we had a Heart Disease hearing just two weeks ago because it is now apparent that we've had a definitive 25% decline in heart disease. The problem is that when you go to Bob Levy, the Director of the Heart, Lung & Blood Institute, and the people that have been working with cardiovascular disease, they can't quite pinpoint the exact reasons why we have had such a dramatic decrease. There are some good correlations which they will continue to follow.

With respect to the quote, no one is denying that we are living longer, thus the reduction in death rate. But we have to look at not just the quantity of life but also at the quality

\*Reference to U.S.S. Saratoga study done by LAIR. See Section 7.

of life. The major reason over the last 60 or 70 years that we have had a dramatic increase in life span, not life expectancy, is because we have had a dramatic reduction in the infant mortality rate. We do know that when we compare men aged 50 in Ireland, Scotland, Sweden, or some other countries to a man aged 50 in this country, that they are living on an average of 10 years longer than men in this country. So life expectancy is a totally different issue, and that's what we are trying to address. In addition, as I said earlier, the critical issue is the quality of life.

One of the reasons that the heart disease death rate has dropped is in part the consequence of better medical interventions. So we have people who are not dying as soon as they would who are being saved by the medical intervention, but what does that say about the quality of their life? They are still functioning far below what they would be if they didn't have heart disease. So all I can say, as Dr. Castelli has pointed out many times, is yes, the death rate is dropping, but you've got to remember that 50% of the people in this country are dying of heart disease and if that is not an epidemic, I don't know what is. Another 20% are dying from cancer. Those are pretty gross numbers.

**Anderson:** But this statement stipulates that this is a continuing down trend in heart disease and cardiovascular disease.

**Hitt:** That's right. Because if you look at the data, people are eating less saturated fats, they're eating less cholesterol, they are getting more exercise, they are smoking less, and they are watching their blood pressure. We've done everything we can in the last 10 or 15 years to alter the major risk factors and it seems to be working, but we still are not able to prove through research yet what the specific cause and effect relationships are.

**Lachance:** I have an awful hard time reconciling some of the things that you'd like to see happen based on the kind of data that you have for input, which is always a little fluffy in my opinion. But worse still, you want the Military to go out and do all this implementation and yet you don't seem to be very protective at all of what's left of what little talent that they have in the research area and that is the sole nutrition talent in the Nutrition Technology Section at Letterman Army Institute of Research in San Francisco, California. They have done tremendous things in the field of nutrition. If you think I was able to set up the space feeding program without the Army, without Natick, you're mistaken, and I don't understand why we just wash this stuff down the drain like it's going out of style.

**Hitt:** Paul, I understand your concern and I would turn it around and say, don't blame the Congress. Congress is not the one that has made the decision to phase out nutrition within the DoD. Look within the DoD.

**Vanderveen:** I object to that. I have spent many years in the Military Service and I know what Congress has done to us. You have got to go back and look at the history of Congress. Because of the Mansfield Amendment, the appropriation bill in 1968 was a tremendous deterrent to the whole area of biological sciences in the Military, and it was the bearish mood that gave the other side of the House the opportunity to wipe out biological research. I don't think Congress is blameless in this and I think that could be part of the people's thinking.

At this point in time, it is easy to blame The Surgeon General of the Army for this situation but I believe that during this period of time of the past 20 years, Congress has said that the Military is doing things that it shouldn't be doing. You ought to be turning this over to the Institutes of Health and that is where I work today. The reason I work there today is because they were going to phase out this type of research as indicated by Congress.

Hitt: I'm aware of that overall policy but I'm talking about the last three or four years. For example, I spent a lot of time last year keeping Letterman alive. The Government Operations Committee within the House has held hearings on the question of LAIR's future. The broader biological sciences issue, I can't address. But what I am saying is that in the last three or four years since I've been working on the Hill, there's been a real concern about the nutrition component of LAIR being phased out, and I spent a lot of time last year pushing the Appropriations Committee to at least give it another year so that a reasonable decision about its future could be made.



## NUTRITION AND CARDIOVASCULAR DISEASE:

### A MESSAGE FROM FRAMINGHAM

William P. Castelli

Population studies in the United States, such as the one in Framingham, reveal rather frightening statistics about Coronary Heart Disease (CHD). For example, in the first 14 years of the Framingham Study,<sup>1</sup> which followed what happened to every other man and woman in Framingham who was in the town free of CHD in 1949, some 5127 men and women in all, every eighth man 40-44 went on to get CHD. Every sixth man 45-49, every fifth man 50-54, every fourth man 55 years of age or older developed some form of CHD in the next 14 years. Women did better, they ran one-sixth of this rate under fifty and half this rate over fifty. The worse statistic of all, however, is what happens to you younger on, namely under the age of 60. By age 60 every fifth man and every seventeenth woman have already had their heart attack. And it is not just Framingham; studies in Tecumseh, Albany, New York City, California, Chicago, Minneapolis, Evans County all show similar rates. The Armed Forces which are largely derived from these same populations probably do no better.

What are we to make of the fall in CHD rates in the last 10 years? This fall has primarily affected death rates which represent 20% of the CHD experience. Indeed, some of the clinical endpoints such as angina pectoris or myocardial infarction have not witnessed a similar fall.

Coronary disease is thought to be caused by atherosclerotic narrowing of the coronary arteries bringing food and oxygen to the heart. The latest theory of atherosclerosis after Ross and Glomset<sup>2</sup> proposes that the first step is to damage the endothelial cells which line our blood vessels. These cells filter the blood fats away from our intimal space which is the inner third of our blood vessel walls. It is here in the intimal space where atherosclerosis develops. What damages these endothelial cells? High blood fats, high blood pressure and turbulence of flow, carboxyhemoglobin, bacterial and viral infections, some amino acids such as homocysteine and a host of other forces. When this happens, the blood fats, particularly the Low Density Lipoproteins (LDL) pour into the intimal space from the circulating blood where their concentration was ten times higher (Figure 1). Platelets come and colonize the denuded area and they secrete a factor (platelet factor IV) which makes more cells, particularly smooth muscle cells migrate to this area. Indeed, if one blocks this platelet reaction by aspirin, or other drugs active in this area, one can, at least in animals, block the subsequent flourishing of the cellular growth in the atherosclerotic lesion. In our opinion, what generally determines what goes on is the level of fats in your blood. All throughout our lives we are probably damaging our endothelial cells from time to time. If you live in a country with low blood fats, while the fat pours through the breach in the endothelial cells barrier temporarily, filling smooth muscle cells with fat cell droplets, there is no overwhelming response of cell growth and shortly the endothelial cells grow back. That is, the individual had a fatty streak for a short time but did not develop a space-occupying lesion. Unfortunately, all Americans live in a country where 95% of the people have too high a level of blood fat, and under the high pressure of blood fats, particularly LDL pouring into the intimal space, there is a stimulation of cell growth that leads to stage II depicted in Figure 1. In addition, the cells all fill with

fat droplets, many cells explode and the fat becomes extracellular. There is an enormous fibrous tissue growth and the subject develops a fibro-fatty plaque which balloons out into the lumen of the blood vessel interfering with blood flow. This is the essential lesion of atherosclerosis. By age 22 in the U.S., largely known from routine autopsy studies done on American soldiers killed in action in Korea and Viet Nam, 45 to 75% of our young men already have fibro-fatty plaques in their major arteries. It will take at least 20 years before significant clinical problems develop in any of them.

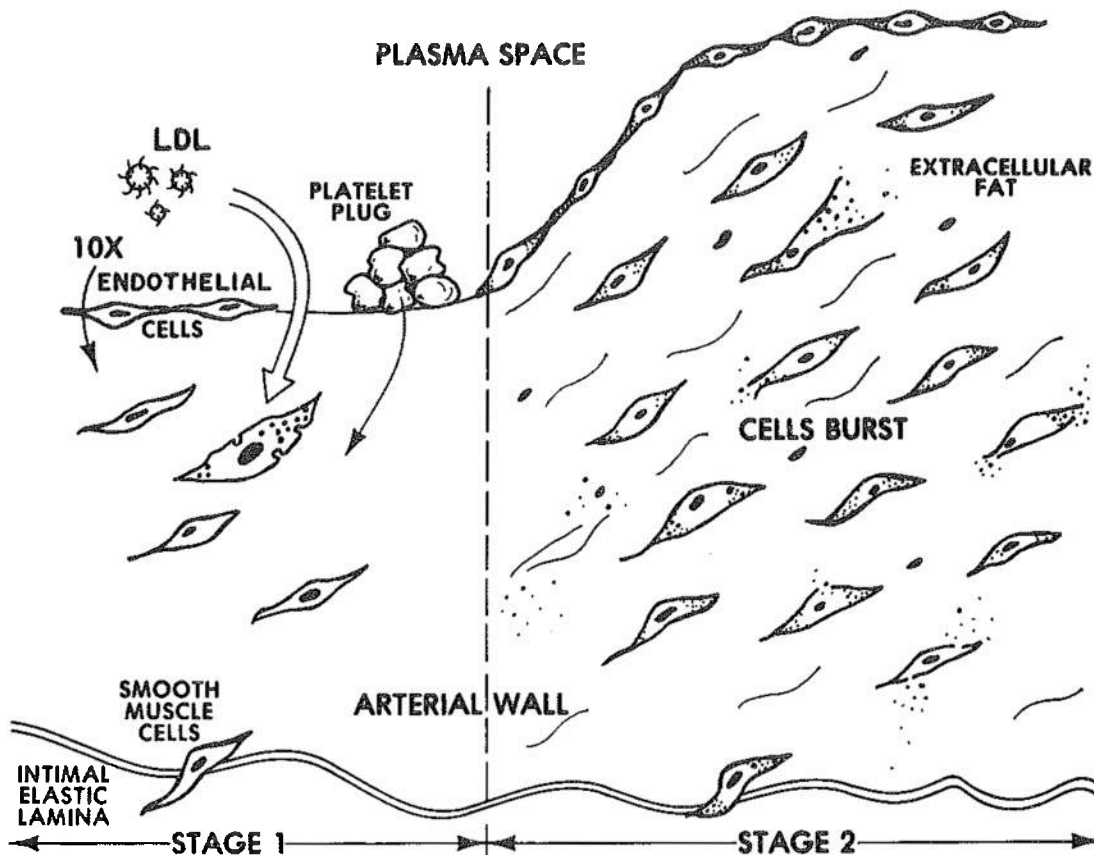


Figure 1

The sine qua non of atherosclerosis is the level of your blood fats. Our blood fats are carried around in our blood in conglomerations of fat and protein molecules which we call the lipoproteins. Figure 2 shows a schematic drawing of a typical lipoprotein particle system. It has an outer crust of cholesterol and lecithin molecules with their water active ends facing out and their lipid active ends facing in. These two polar lipids, free cholesterol and lecithin, have one end that likes to be in water and one end that likes to be in fat.

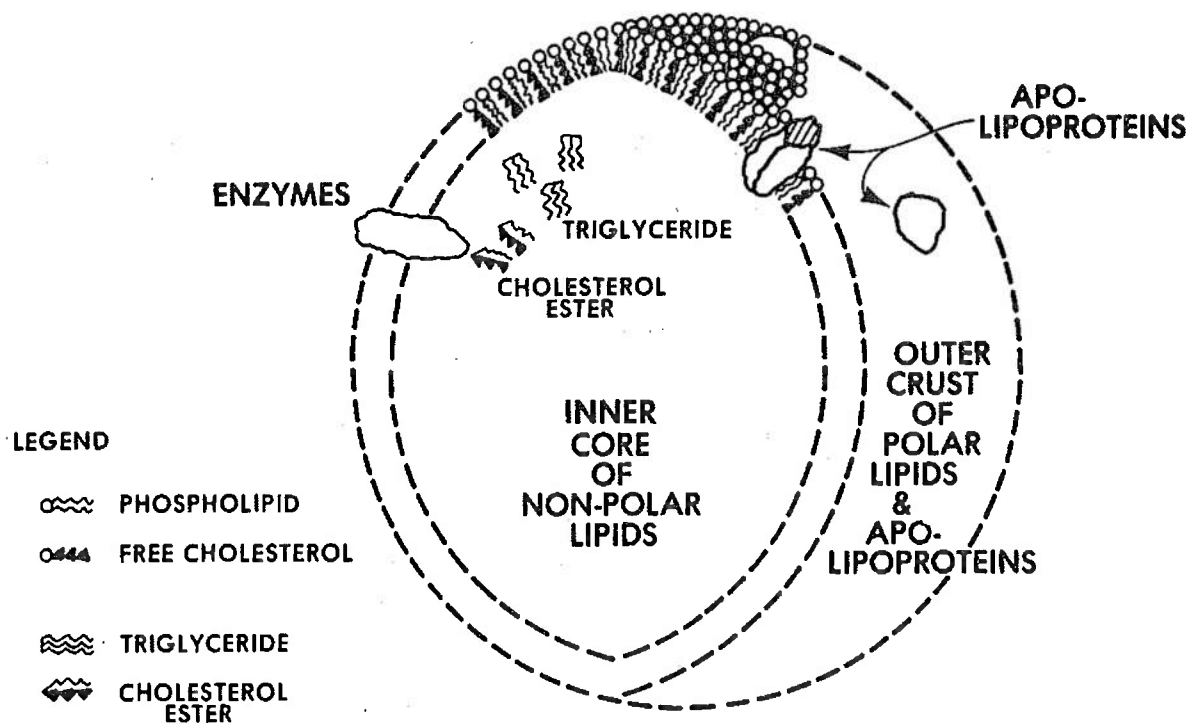


Figure 2

All of the cellular membranes in our body are made up of these two lipids. Inside our fat particles being carried about, so to speak, are two other fat molecules, triglyceride and cholesterol ester. These are non-polar lipids and can only survive in a total lipid environment. In addition to these fat molecules, we have protein molecules in the outer crust of our fat particles and we call these the apo-lipoproteins. We have five major categories of these: A, B, C, D, and E apo-lipoproteins.

We have five major fat particles or kinds of lipoproteins in our plasma Figure 3. They have a variety of names and numbers; we will use the ultracentrifuge names and call these particles chylomicrons, very low density lipoproteins (VLDL), intermediary density lipoproteins (IDL), low density lipoproteins (LDL) and high density lipoproteins (HDL). As Figure 3 shows, they differ in their composition of proteins and fats. The point I wish to make here, however, is simply that each of these particles carry cholesterol and in that sense, we all have five different kinds of cholesterol in our blood. Chylomicron cholesterol are probably not directly atherogenic. Elevation of chylomicrons leads to a tendency to develop pancreatitis, so it is

not a good thing to have. The most dangerous particle is LDL. It is by far the most atherogenic. IDL is also thought to be atherogenic but few of us seem to have a problem with it. VLDL is probably not directly atherogenic but leads to IDL and LDL. Thus, four of the five cholesterol, when they become elevated in our blood are not good for us. The other one, HDL, seems to protect from subsequent CHD and has prompted those great medical journals that our patients read — like the Reader's Digest, to call HDL the good cholesterol.

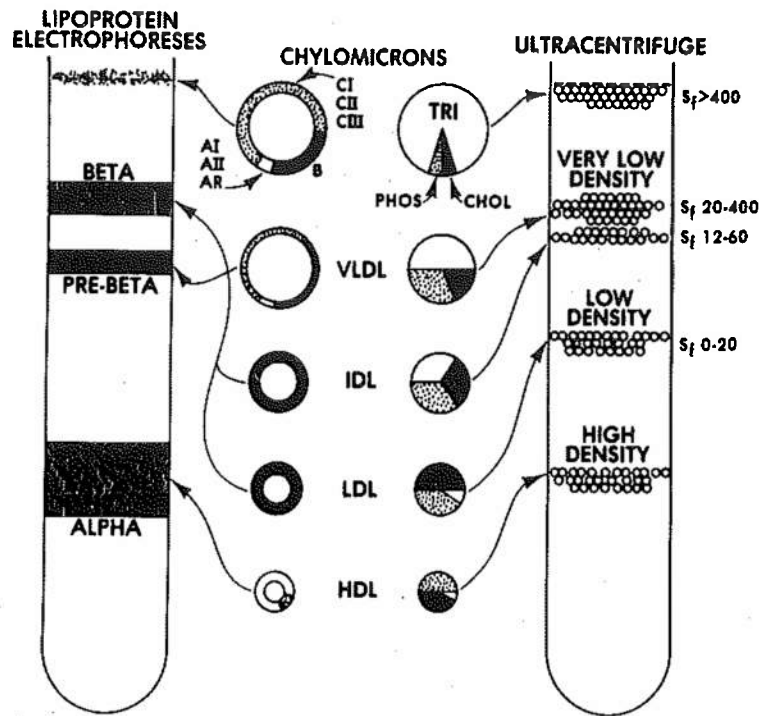


Figure 3

To understand the impact of nutrition on these lipoproteins, it is well to describe their formation and fates. We eat 100 to 120 grams of fat per day in this country and most of this is triglyceride fat. We eat cholesterol but less than one gram (about 550 mg). Figure 4 shows that these two molecules are taken up into our bodies from the intestine into intestinal cells. These cells form a chylomicron to transport these two fats throughout our body. Inside chylomicrons are mostly triglyceride, a reflection of what we had to eat. They come out of our intestinal cells with mostly B apo's but their major apo's are the C apo's which they eventually get from HDL. They need the CII apo to activate an enzyme found on endothelial cells all over our body known as lipoprotein lipase. This enzyme goes inside our chylomicrons to break down the triglycerides to free fatty acids which are small enough molecules to get

across cell membranes and into cells. If a person lacks either the CII apo or lipoprotein lipase, none of the fat that gets into their plasma (as chylomicrons) will get out and they will develop a type of hyperlipoproteinemia known as the Type I of Frederickson-Levy-Lees. While these people do not get atherosclerosis, they are at high risk of pancreatitis, particularly if their total triglycerides go over 1000 mg%. They are treated by a very low fat diet. Occasionally, a diabetic will be present with this problem because lipoprotein lipase is an insulin dependent enzyme and these diabetics are not getting enough insulin to make it. In that case, increasing the dosage of insulin eliminates the chylomicron problem. Some rare cases who lack the CII apo have been described recently and they develop a chylomicronemia.<sup>3</sup> Recently Zilversmit<sup>4</sup> has proposed that chylomicron remnants — what is left over after much of the triglyceride has been removed from chylomicrons — may be atherogenic and in that sense would represent another risk of eating a high fat diet.

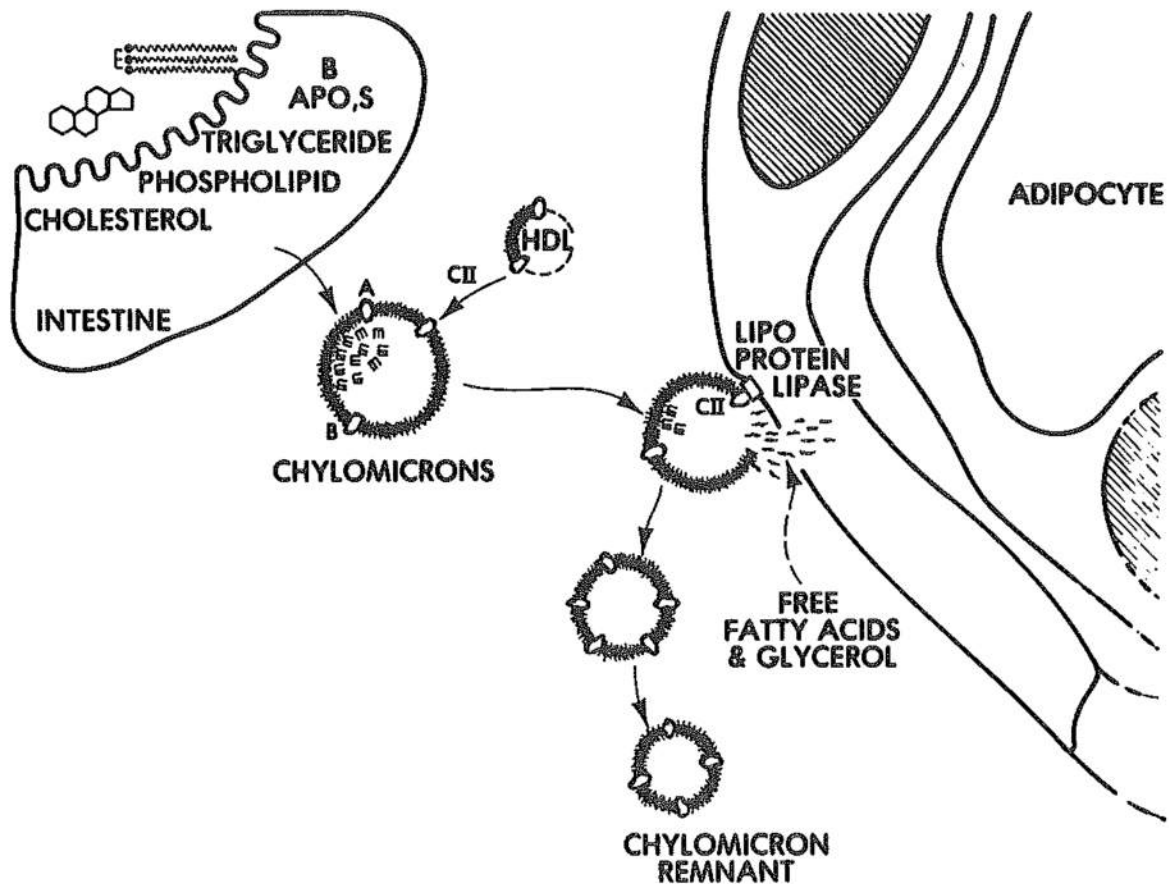


Figure 4

The other place in our body where we make lipoprotein particles is our liver. As depicted in Figure 5, coming back to our liver from having eaten a high fat diet is a wave of free fatty acids which are mostly reesterified to triglyceride in our liver. Under some settings — high levels of saturated fatty acids — there may be a stimulation of cholesterol production

by the liver. Of course, coming back to the liver from any source of excess calories — alcohol, carbohydrate or protein — will be molecules that will be eventually made into fat. This fat will primarily be triglyceride. Out of the liver from all of that comes the next particle system, the very low density lipoproteins (VLDL). These have a structure similar to the chylomicrons and some are also made in the intestine. Inside they are mostly triglyceride; they leave the liver with mostly B apo's but the C apo's, which they get from HDL are their major apo's; they need to get the CII apo to activate lipoprotein lipase so they can break out their free fatty acids to get them efficiently across cell membranes. When this happens, they are converted to the next fat particle, the IDL. Their apo C's are returned to HDL when this happens. The IDL's return to the liver where, thanks to apo EIII, they activate another enzyme, hepatic lipase to be converted finally into LDL. LDL will eventually be taken up into cells. One other thing that has been going on is VLDL left the liver and was converted to IDL and eventually LDL. We have gone from a particle largely carrying triglyceride (VLDL) to one largely carrying cholesterol ester (LDL). How did cholesterol ester get inside LDL? One theory suggests that all along the way VLDL, IDL and LDL have interacted with HDL where there is an enzyme (LCAT) to esterify cholesterol. That HDL picks up free cholesterol which is bouncing all over our body and esterifies it and puts it back inside VLDL, IDL and LDL thanks to yet another apolipoprotein, apo D. If one develops an elevated level of LDL that is referred to as Type IIA hyperlipoproteinemia, elevated levels of IDL are referred to as the type III, and elevated VLDL, type IV. One can have more than one type of particle system elevated in the blood. Too many VLDL and chylomicrons is called the Type V or the mixed hyperlipoproteinemia. Too much VLDL and LDL is type IIB or what used to be called the combined hyperlipoproteinemia and is now referred to as the multiple type hyperlipoproteinemia. These various types are called "familial" when they are found to be transmitted by powerful genetic mechanisms, usually reflected clinically as finding a first degree blood relative with the same type or in the case of the multiple types, a different type.

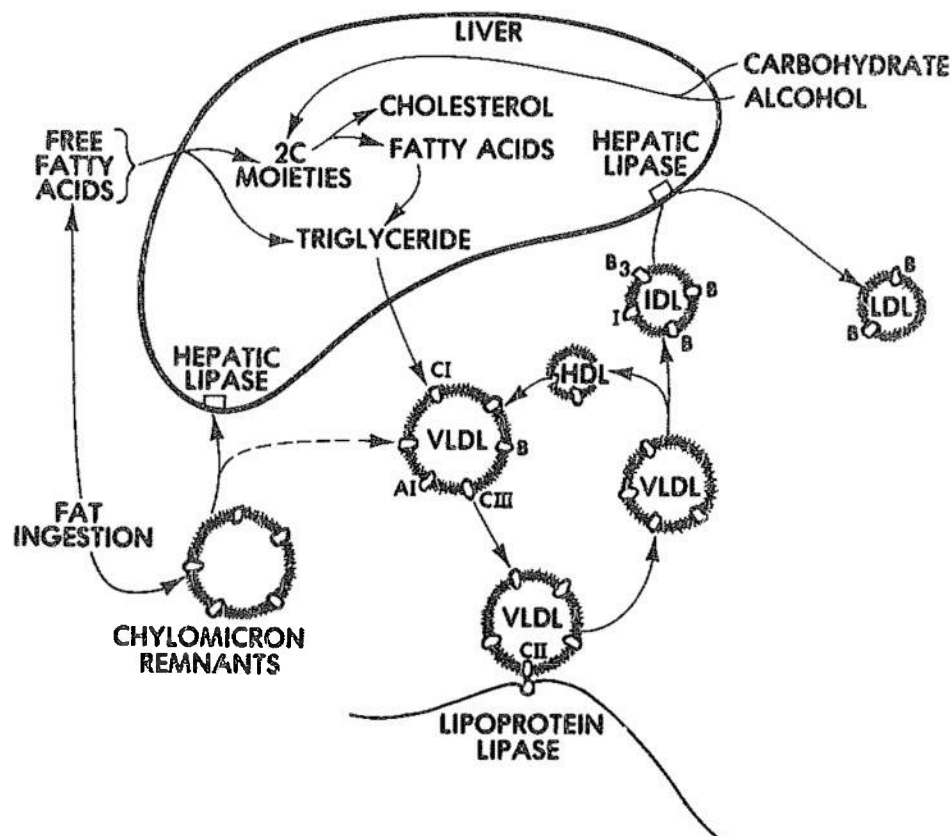


Figure 5

How many people are affected with these types of hyperlipoproteinemia? Frederickson-Levy-Lees defined the type II's according to the level of LDL cholesterol. As Figure 6 shows, they measured LDL cholesterol on normal volunteers at the NIH and defined the type II problem as anyone who fell into the upper 5%. That tells you that every twentieth man, woman and child in this country is a type II by definition. How do these people do? In the first degree blood relative study at the NIH where about 1000 first degree blood relatives were found of the original type II cases studied there, 44% of these first degree blood relatives had the same type II as the index case at the NIH. Not only that, one in three men with this problem had developed CHD by the age of 40, 2/3 of the men with the type II problem had developed CHD by age 60. One-third of the women with this problem have CHD by age 60. Go to any coronary care unit in America. Any man there under the age of 40 probably has this problem and not only that, so does half of his children and half of his brothers and sisters. Type IV was defined in the same way only using the fasting triglycerides in people without a chylomicron band after their plasma stood overnight at 4°C in the refrigerator (99.4% of a general population). Thus, every twentieth person has the type IV problem. By measuring LDL cholesterol and triglycerides one can diagnose all the type IIA's (people who meet LDL criteria in Figure 6), all the type IV's (people who meet the triglyceride criteria by age) and all the type IIB's (people who meet both LDL and triglyceride criteria in Figure 6). If one gets all these types, they represent 99.5% of all the types of hyperlipidemia in a general population.

### LIPOPROTEIN TYPES

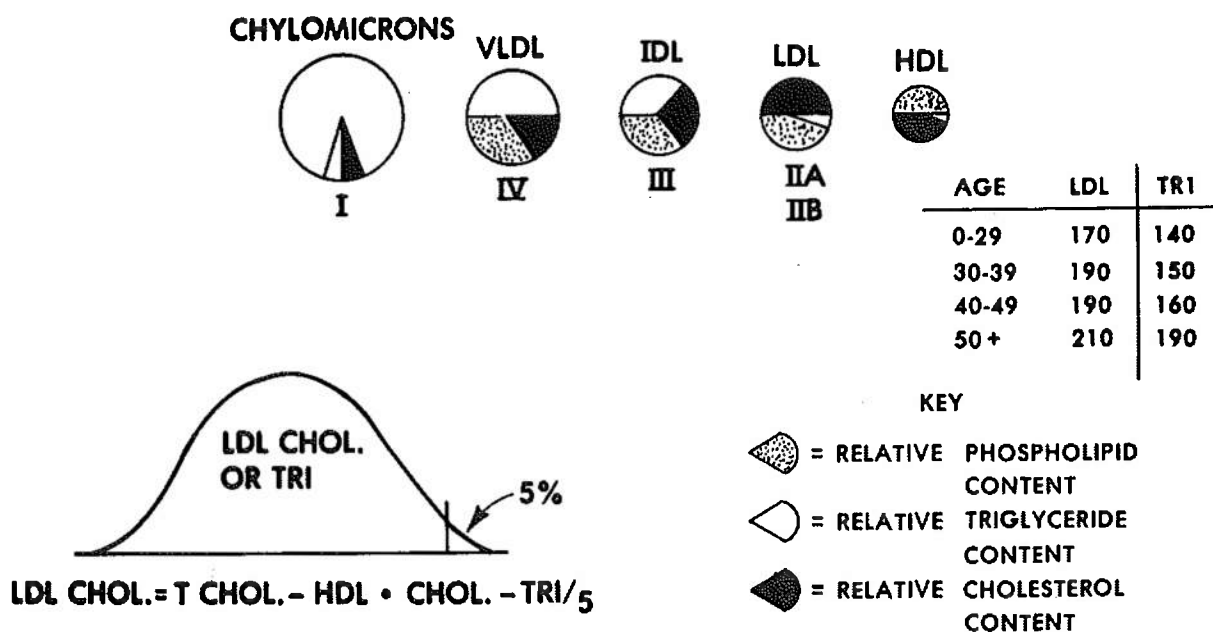


Figure 6

These lipoproteins were measured in Framingham earlier on, thanks to Dr. John Gofman.<sup>5</sup> As Figure 7 shows, anyone with elevated LDL or Sf 0-20 Beta, lipoproteins had the greatest rate of subsequent heart attack. People with the highest level of VLDL or Sf 20-400 pre Beta lipoproteins also did very poorly. Of course, people whose LDL and VLDL just missed being in the highest levels did not do very well either. Even the total cholesterol was an excellent predictor of risk earlier on in Framingham as the figure shows. Unfortunately, as the population aged, the total cholesterol lost its value as a good predictor of risk. Over the age of 50 it has practically lost its power.

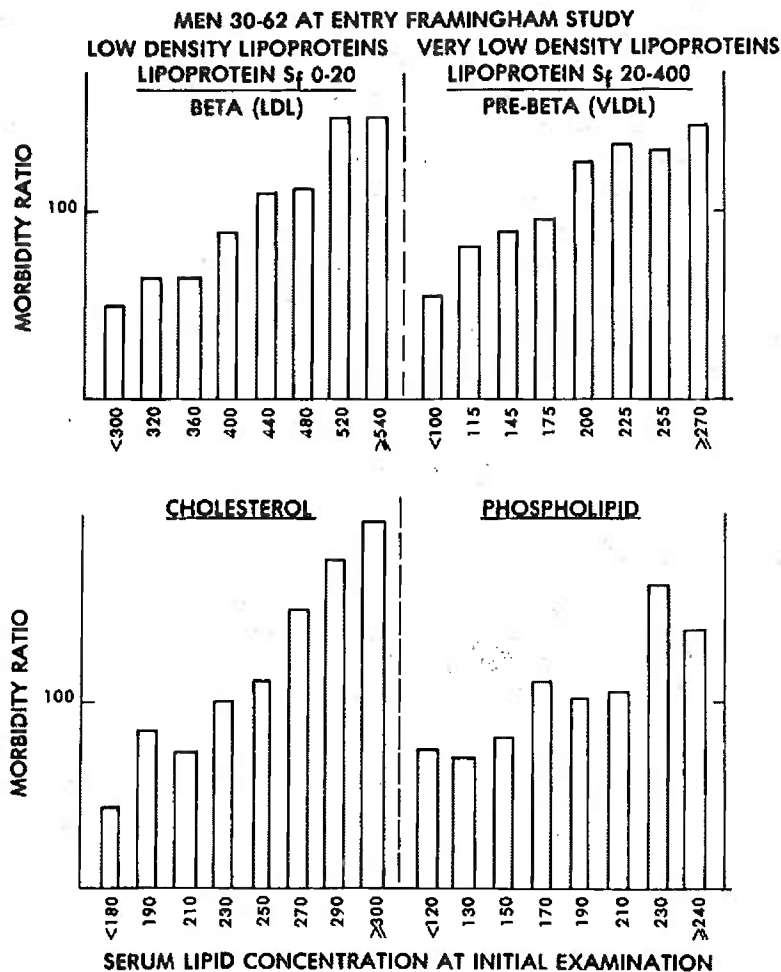


Figure 7

Most research in this country has focused on cholesterol metabolism. Brown and Goldstein<sup>6</sup> have described how most of our cells manufacture cholesterol. Of the 26 steps in that process, control is exercised at the third step, catalyzed by the enzyme, HMG Co A reductase. What influences this enzyme is what eventually happens to your LDL cholesterol. It is taken up into your cell by a very special mechanism, involving a first step whereby LDL is absorbed onto the cell by a special LDL receptor which triggers the cell to incorporate the LDL into it by a process of endocytosis. The LDL then ends up inside a vacuole inside the cell. A conglomeration of enzymes carried in our cell called "the lysosomes" moves over



to this vacuole and drops enzymes inside the vacuole. Some of these enzymes digest the proteins to amino acids which are small enough molecules to get out of the vacuole. Others digest the cholesterol ester of LDL to free cholesterol. Cholesterol ester can not get out of the vacuole very rapidly, but free cholesterol leaves quickly and somehow goes up and influences HMG Co A reductase to turn down the cholesterol manufacturing process.

Now many detractors from the cholesterol-diet theory use this model to explain why diet has nothing to do with the problem of atherosclerosis. They claim that the body makes most of our cholesterol anyway. In the late 50's, two biochemists, Morris and Chaikoff<sup>7</sup> showed that if you feed a rat cholesterol, it will shut down cholesterol production by 80% and that if you take cholesterol out of the rats diet, it will make up that production by 80%. And, in the rat at least, it mattered very little whether cholesterol was added to the diet. This, of course, is not true in humans. A host of studies have shown<sup>8</sup> that ingestion of cholesterol changes our cholesterol. Brown and Goldstein seem to show us one reason why that is so. They showed that all we need next to our cells is 2-4 mg% of LDL cholesterol, that when all our endocytosis and lysosomal mechanisms are functioning correctly, we will keep cholesterol production under control. Two to four mg% next to our cells is equivalent to 20-40 mg% in our plasma due to filtration factor of about 10 across our endothelial cell barrier. Of course, we all have 120-140 mg% of LDL cholesterol in our plasma or 4-5 times more than we need. If we all went on a vegetarian diet tomorrow, even after our total serum cholesterol hit 100 mg%, we would still have enough LDL cholesterol next to our cells so they would not greatly increase production.

Of course, Brown and Goldstein are much better known for something else. Namely, they found that about one in 500 people in the general population lacked the special LDL receptor on cells that allows us to internalize LDL at a fraction of the level found in all Americans to keep cholesterol production under control. These people who lack this special LDL receptor have runaway cholesterol production and they churn out cholesterol until their serum cholesterol hit 350, 450, 650, 800, and even higher. At these higher levels, the LDL gets into their cells through less efficient mechanisms to eventually turn down the production but not until the thermostat is set at very atherogenic levels of LDL cholesterol. Many of these people with an LDL receptor problem can be identified by a simple clinical search for tendon xanthomas. If a patient has a tendon xanthoma, that patient has an LDL receptor problem.

Ten years ago, we began to measure high density lipoproteins (HDL) cholesterol in Framingham. The higher your HDL the lower the subsequent rate of CHD. Women have much higher levels than men and this might explain why they run lower rates of CHD. We were born with a cholesterol level of 70 mg% with an HDL of 30 mg%. By the end of the first year of life total cholesterol has risen to 150 mg%, HDL cholesterol to 55 mg%. Men and women stay at 55 mg% until men reach puberty and then their HDL cholesterol fall to 45 mg%. Men stay at 45 and women at 55 mg% for the rest of their lives. Our total cholesterol at 150 mg% would prohibit us from developing CHD but somewhere in the late teens, twenties, and early thirties we see our total cholesterol leave the relatively safe range of 150 mg% to rise to just over 200 mg% where we have an epidemic of CHD.

If HDL is so good for us, how does it work? Most HDL is probably made in the liver and is excreted as little flat discs called nascent HDL. Some feel that this is the HDL<sub>3</sub> of the analytical ultracentrifuge. This kind of HDL does not protect you from a heart attack. It is converted to HDL<sub>2</sub> by an enzyme known as lecithin cholesterol acyl transferase (LCAT). This enzyme takes a fatty acid from lecithin and transfers it to cholesterol, changing free cholesterol to cholesterol-ester. When LCAT works on HDL<sub>3</sub> it converts it to HDL<sub>2</sub> by filling up the interior with cholesterol ester.

Free cholesterol bounces in and out of cells very rapidly and any fat particle which shows up outside a cell will exchange free cholesterol with that cell. However, no net exchange of cholesterol occurs until HDL shows up outside the cell. Then HDL, which carries LCAT, will grab onto bouncing free cholesterol molecules, esterify them, and tuck them into the interior of HDL where they cannot get back into the cell very readily. Because of this there is a net flux of cholesterol out of the cell into HDL where the cholesterol starts its journey back to the liver where 95% of the cholesterol is excreted per day that leaves the body (Figure 8).

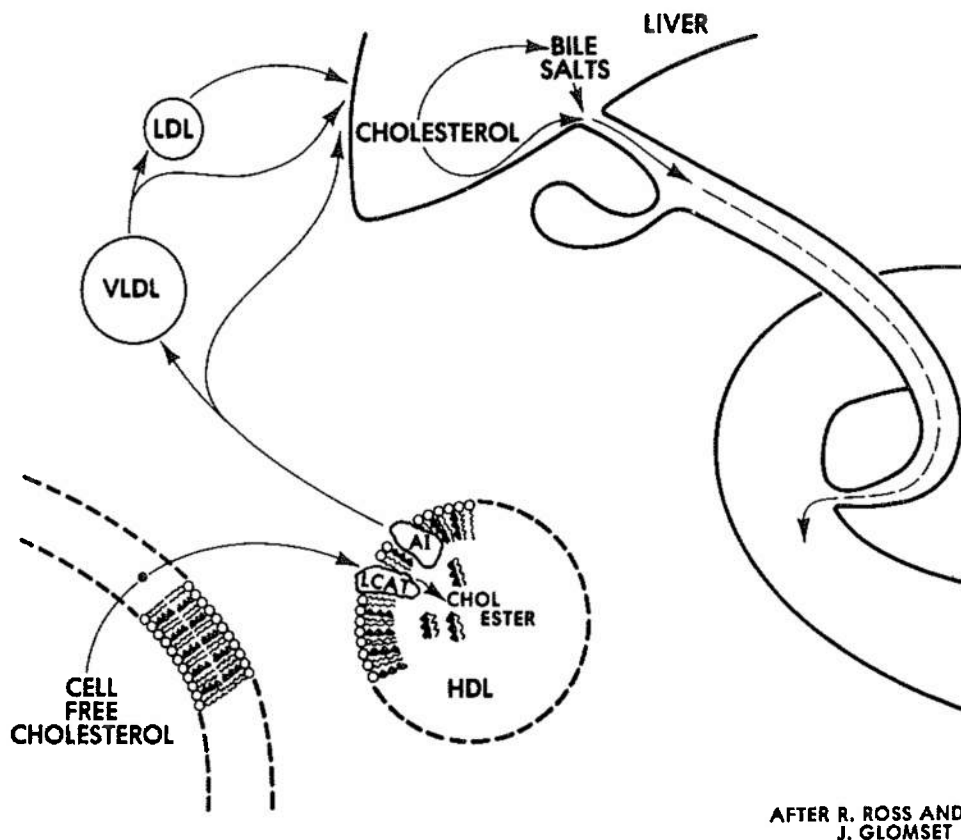


Figure 8

The heart of this reverse cholesterol transport system is HDL; the higher your HDL the lower your total body cholesterol.

HDL is thought to work for us in another way. To understand this, we must take a step back and consider what is the basic cellular lesion of atherosclerosis. Christian DeDuve has proposed that we call this the Fat Cell Syndrome.<sup>9</sup> LDL is taken up into vacuoles in cells and digested by lysosomal enzymes — in particular, lysosomal lipases break down the cholesterol-ester to free cholesterol and fatty acid which can get out of the vacuole. Failure to digest cholesterol-ester results in cells filled with vacuoles of cholesterol-ester. If one is born without lysosomal lipase, that is known as Wolman's Disease and results in death by the age of 14 months from the Fat-Cell Syndrome. Cholesterol-Ester Storage Disease occurs in people who have less than 10% of lysosomal lipase and they are in trouble in their twenties. Of course, in a way DeDuve is implying that we all get this disease in America. We all have far too much LDL cholesterol and our cells are overwhelmed by it eventually. It is here, however, that HDL bales us out; it blocks internalization of LDL after the work of Carew et al.<sup>10</sup> So it would appear that how we do in life is the outcome of our cellular level of the battle going on between HDL and LDL.

To gain a better perspective on this problem in America and a better understanding of why there is such a debate over cholesterol, it is well to look at the distributions of total cholesterol of those who went on to get a heart attack in Framingham versus those who didn't. As Figure 9 shows, there is a tremendous overlap. One wonders why the total cholesterol ever predicted risk when we look at these distributions.

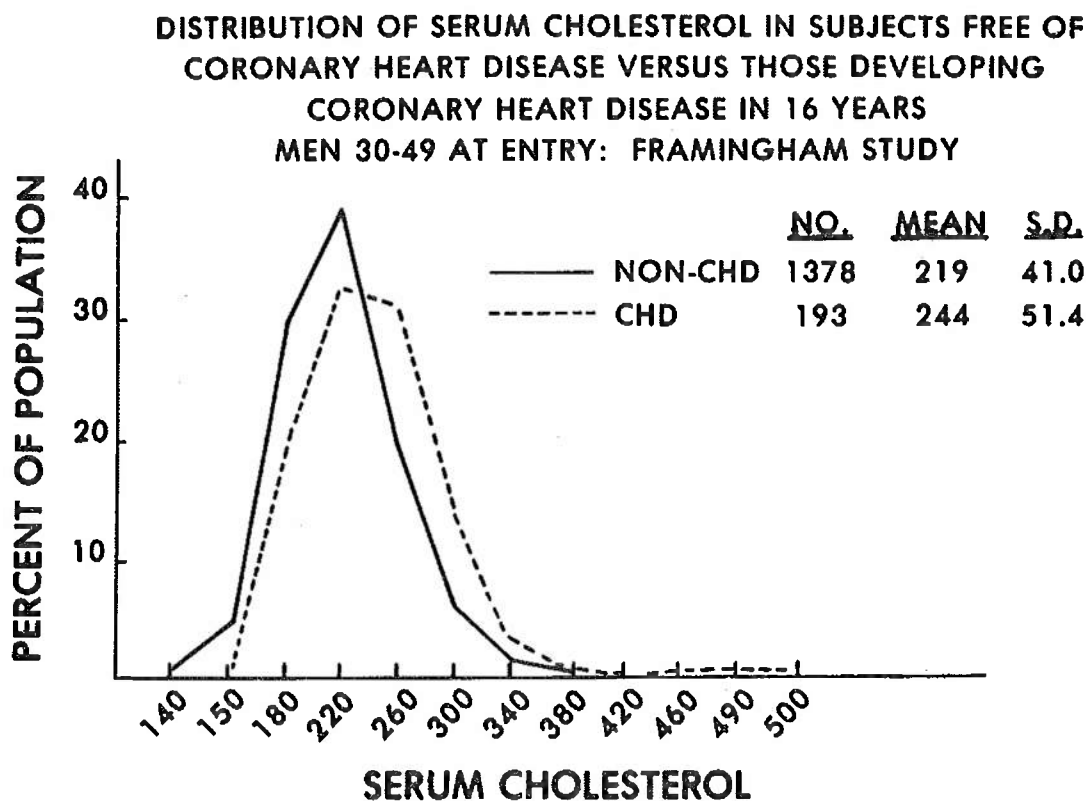


Figure 9

The problem with interpreting cholesterol in America goes something like this: Most of our lipid experts are only interested in your cholesterol if it is over 300 mg%. At that level you have hypercholesterolemia, possibly even monogenic hypercholesterolemia. They feel that this is the major cause of our CHD epidemic. Unfortunately, 75% of the heart attacks that occur in our country occur at much lower cholesterol — at cholesterol between 150 and 300 mg%. The average man who developed CHD in Framingham had a cholesterol of 244 mg%. Over a quarter of our entire population have a cholesterol over that value. One might ask, "Is there a safe cholesterol — a cholesterol below which I would virtually never get a heart attack?" In Framingham we have not seen a heart attack in anyone whose cholesterol was below 150 mg% and that is roughly true. However, go to any country where the average cholesterol is about 150 mg% and I will show you a country that has trouble finding any coronary heart disease. It can usually be found in those countries in the large cities where the well-to-do live.<sup>11</sup>

Most people looking at Figure 9 would say, "All I really want to know is that at any given cholesterol over 150 mg% am I on the curve to get a heart attack, or the other curve that stays free — and how can I tell?" One of the best ways to tell is to look at your HDL cholesterol. Remember that for every 5 mg% you fall from 45 your risk rises 25%. Actually, we feel the best way to assess how you are doing is to make a simple ratio of total cholesterol divided by the HDL cholesterol. We feel that anyone whose ratio is over 4.5 should start to worry about excess risk of CHD. However, this means that half our women are at excess risk and far more than half our men.

Thus, we can do a far better job of identifying people at risk. The question then becomes, what can be done about it? Of course, it has been known for a long time that changing saturation of fat and cholesterol intake will allow one to alter primarily the bad kinds of cholesterol, particularly LDL cholesterol.

Translated into everyday menus in this country we know that for every 100 mg% of cholesterol you eat per day, you change your serum cholesterol by 5 mg%. One egg yolk is worth about 13 mg% on our cholesterol count of mostly the wrong kinds of cholesterol. Very few of us can afford to eat even one egg yolk per day. We don't dislike the egg. It has excellent protein and it is mostly found in the egg white. Go into any restaurant. The menu says eggs any style for breakfast. All we need to say is, "I'll have two fried egg whites please". Or, eat cereals and mix them with low fat milk. Together they provide a very well balanced protein. Pick cereals that are high in protein — avoid those that are 50% sugar.

Eat less meat — one could easily get by with small portion sizes, 3 ounces or less. Eat chicken and turkey (without the skin), fish and veal. Avoid beef, pork, and lamb. Stay away from foods such as hot dogs, salami, bologna, luncheon meats, where fat scraps were processed and stuffed inside a hot dog casing. The average hot dog in America has 82.6% of its calories from fat.

Eat margarine in place of butter, but only a margarine where the first word under the list of ingredients is "liquid". Actually, the best margarines begin with the word "water", but then you have to know that the parent margarine started with the word "liquid".

Eat low fat milks and low fat cheeses. Stay clear of commercially baked goods that used a totally saturated oil for shortening because it resists auto oxidation and will have a longer shelf life. The cookies, chips, or dairy creamer made with such fat may have a longer shelf life but the person who eats them may not.

What about raising HDL? Eat less, lose weight, and your HDL will go up. Fish, brewer's yeast, vitamin E, lecithin, ginseng, cadmium, garlic, quitting smoking all raise HDL. Atromid-S and nicotinic acid raise HDL. Exercise apparently raises HDL; of course, remember that it can't accomplish everything. If one runs one mile you will burn off 100 calories. A hot fudge sundae is 4½ miles. A large double hamburger is 5 miles, etc. Alcohol raises HDL, but with so many alcoholics in this country, it is a message we can hardly deliver. Chlorinated pesticides also raise HDL, so not everything that raises HDL is good for you!

We have seen falls in cholesterol, blood pressures, blood sugar, and uric acid with weight loss in Framingham. But what is the evidence that if you follow a diet you do better in life? So far studies done in London (17%), Oslo (35%), Helsinki (50%), New York (50%), New Jersey (35%) and Los Angeles (25%) have lowered the subsequent rate of overall heart attacks by the numbers shown in the parentheses. In most instances, these were statistically significant falls. Death rate, while lower, was not always significantly reduced.

Even the atherosclerotic lesion itself is largely reversible. Studies in monkeys brought to 90% stenosis will have 80% of these lesions melt away in the next four years when the monkey is taken off the atherogenic diet. These studies have been done in Iowa City, Chicago, Winston-Salem, and New Orleans. Of course, two years after the German occupation in Europe atherosclerosis disappeared from routine autopsies done in Belgium, Holland, Poland and Norway. There are many anecdotal case histories where coronary angiography has revealed reversibility to have occurred largely in persons who went on a vegetarian diet.

Still many people are skeptical. They say the fall in subsequent CHD on the diets was not impressive. Many fail to realize it was, however, in proportion to the fall in cholesterol obtained by the diet.

What is the message then for our Armed Forces in all this? In the first place, we can predict fairly well what is going to happen to men and women in these services. Every fifth man and every seventeenth woman will have their heart attack younger. Every twentieth man and woman will have a genuine lipid problem — whether monogenic or polygenic it will greatly increase their risk of early and premature heart attack. Are there programs to identify these people before their heart attack? Can they get the special diets required to manage their problems? What of a general reduction overall of high cholesterol foods, foods high in animal saturated fats to better prepare all of the Armed Forces personnel for a healthier older age? When one begins to see that many of the pure vegetarians in societies like the Seventh Day Adventists have only a fraction of our heart attack rate, 40% of our cancer rate and live 7 and 3 years longer than our men and women, respectively, is it possible to get vegetarian fare in the Armed Forces? All in all this is a saner and safer diet than the current American diet which is too rich in fats for most of us. If HDL is telling us anything, it is saying that the body has a way of undoing some of the bad if we will only give it a chance.

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## OBESITY: AN EVALUATION OF TREATMENT

George A. Bray

### INTRODUCTION

One of the Dietary Goals presented in the document prepared by the Senate Select Committee on Nutrition and Human Needs clearly states the basic philosophy for preventing and treating obesity.

"To avoid overweight, one should consume only as much energy as is expended. If overweight, decrease energy intake and increase expenditure."<sup>1</sup>

The difficulty comes in putting this sound dietary advice into practice. Anyone who has tried knows how difficult it can be to translate this recommendation into action. Since treatment is so often difficult, prevention would be preferable. In no field is the old adage that "an ounce of prevention is worth a pound of cure" more apt than in obesity. As yet, however, we don't know how to prevent obesity, nor can we identify with any accuracy obese individuals before they become obese. The best we can do is to identify families where both parents are fat, but even then not more than 80% of the children will be obese.<sup>2</sup> This paper will review what can be done to help the obese individual and suggest that there is room for considerable improvement. Some of the recent therapeutic studies conducted in our laboratory over the past 15 years will be presented. This longitudinal perspective is different from the usual comparison of treatments in which the effectiveness of a drug is compared with a placebo when both treatments are given in close relationship. There are very little data comparing a series of treatments conducted in one clinic over a period of years and even less attention has been focused on placebo treatments. These are the treatments that are alleged to have no effectiveness. Careful examination however indicates that some placebo treatments are significantly better than other placebo treatments. This type of comparison may provide useful clues about future directions in the treatment of obesity.

### ENERGY BALANCE

Basically, obesity is a problem of energy expenditure. Obesity results from an imbalance between energy intake as food and expenditure of the energy for metabolic purposes and physical activity.<sup>3</sup> Gaining weight results from eating more calories than are needed. It is the total amount of food energy not whether it comes from fat, protein or carbohydrate that is important. Figure 1 shows that excess quantities of fat produces weight gain in normal weight individuals. This illustration was taken from the Vermont study conducted by Dr. Sims and his colleagues.<sup>4</sup> When the diet was supplemented with fat in the range of 1000 calories per day more than were being expended, the normal volunteers gained weight. From this data it becomes clear that the concept put forward by other authors<sup>5</sup> — namely that you can eat all the fat you want without gaining weight — is a myth. Obesity can also occur by ingesting carbohydrate or proteins in amounts above those required for energy needs.

SUBJECT T  
 MEAN DAILY EXCESS 826 kcal  
 TOTAL EXCESS 68,616 kcal

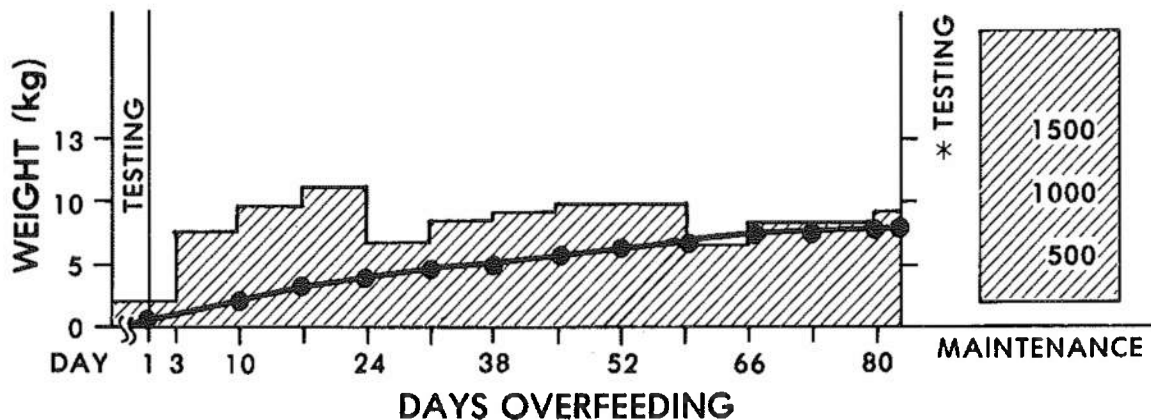


Figure 1: Change in body weight during overfeeding with fat. During the 83 days of this study subject T ate between 500 and 1000 kcal/day more than his maintenance level. His body weight rose by approximately 9 kg.\*

Figure 1 is from Goldman et al. Experimental Obesity in Man:<sup>4</sup> Metabolic Rate in Relation to Dietary Intake. In: Obesity in Perspective (ed. G. A. Bray) DHEW Publication No. (NIH) 75-708, pp. 165-186, 1976.

Corpulence occurs by eating too much food energy and it doesn't seem to matter from what source those calories come. If 100 calories more per day are stored than are needed, an additional ten pounds as adipose tissue will be accumulated in a year. If continued this accumulation of fat amounts to an additional 100 lbs (45 kg) per decade. Many of the patients who have visited our clinic have weighed over 300 lbs, and most of them were under 30 years of age. A graph of the body weight age for this group is shown in Figure 2. It is evident that body weight rose with age and represented a net storage of 100 calories or more per day for most of their lives. When comparable amounts of excess food energy as fat, carbohydrate or protein are eaten from the diet, comparable rates of weight gain occur if the caloric cost of storage for each type of food energy is taken into account. The caloric cost of storage for fat is about 10%, for protein and carbohydrate anywhere from 25% to 35%. By taking the energy costs for converting these foods into the storage fuels (fat), it is fair to conclude that a calorie is a calorie; it doesn't make a significant difference in terms of fat storage as to the form they come in.

If weight gain occurs by ingesting more food energy than is needed, to lose weight one must eat fewer calories than are required each day. Alternatively, calories can be dissipated by increasing energy expenditure. When eating less, it doesn't seem to matter what the composition of the diet is. It is the total calorie deficit that accounts for the mobilization of stored energy to provide for bodily needs and thus produce weight loss. Weight loss is essentially linear when the total calorie intake was maintained at the same level (see Figure 3). This occurred despite considerable variation in the composition of the foods given.<sup>6</sup> Thus, it is fair to say that a calorie is a calorie whatever its source. A reduction of similar magnitude in calories from fat, carbohydrate or protein will produce essentially the same rate of weight loss.



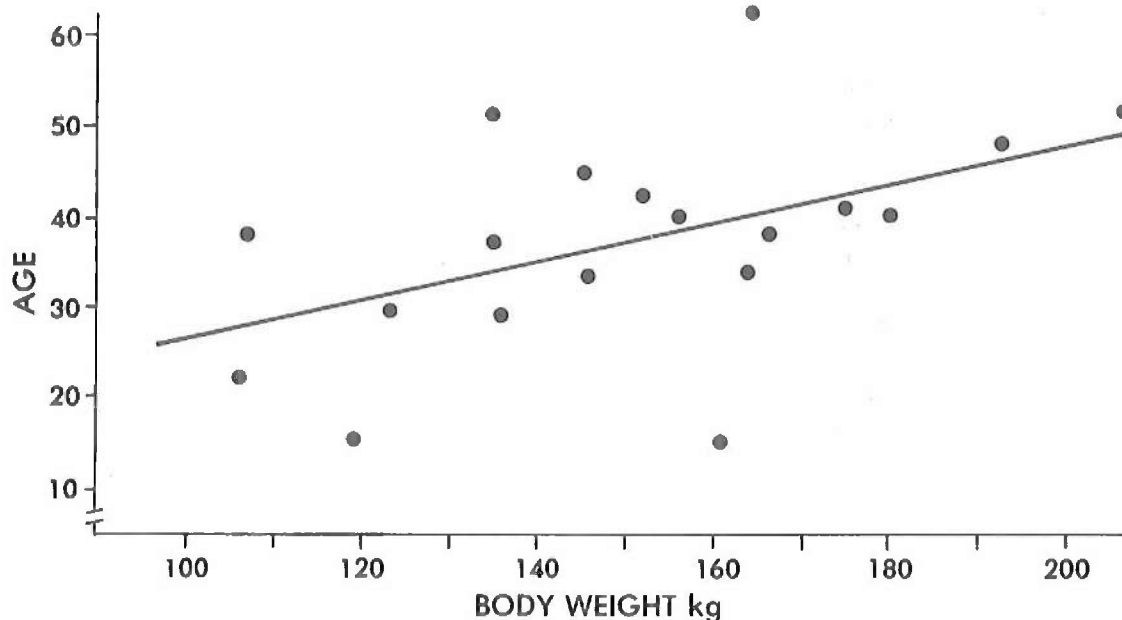
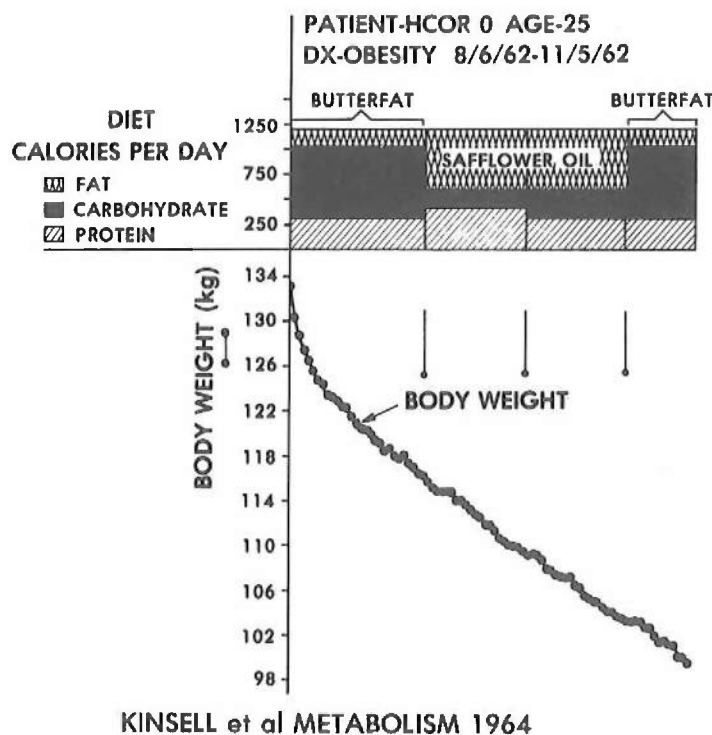


Figure 2: Age versus body weight. For this group of individuals weighing in excess of 140 kg, there was a positive relationship between age and weight of approximately 4.5 kg/year. (Copyright G. A. Bray, 1979 reproduced with permission).



KINSELL et al METABOLISM 1964

Figure 3: Effect of dietary composition on weight loss. This individual was placed on a diet containing less energy than required to meet the body's needs. Weight loss, after the initial equilibration, depended on caloric intake, not the composition of the diet. (Reproduced from Kinsell et al, Metabolism 1964, with permission).

The question of how to lose unwanted fat depends in part on how many extra calories are stored up in fat deposits. Figure 4 is a graph of the body weight of American women aged 35 to 44 obtained from the National Center for Health statistics and is presented as the cumulative percentage of women weighing more than a given weight.<sup>7</sup> It indicates that less than 1% of the women of this age in the United States weigh under 80 lbs (36 kg) and that less than 1% weigh over 240 lbs (110 kg). The majority (75%) of the women have body weights of under 140 lbs (64 kg). Using 20% above desirable weight as an index of obesity, the recent prevalence data for this country provided by the National Center for Health Statistics show 24% of the women and 14% of men aged 18 to 74 to be overweight.<sup>8</sup> These numbers indicate that at least 16.5 million American women and 8.3 million American men are significantly overweight. There are thus significant numbers of men and women in this country who may be at risk for the hazards associated with obesity.<sup>8</sup> The appropriate treatment for obesity thus depends on the risk associated with the degree of excess weight. The degree of overweight can be expressed using the body mass index. The body mass index is measured at  $Wt/Ht^2$ .<sup>2</sup> With weight measured in kg and height in meters the normal values range between 20 and 26. A nomogram for determining the body mass index (BMI) is shown in Figure 5.<sup>9</sup> A body mass index of 30 is equivalent 30% overweight, a degree of excess weight that is associated with a 25% to 33% extra risk to life.<sup>9</sup> People with body mass index over 40 are at very high risk and may have up to 11 times the extra risk of people with normal weight. The risk to health of extra weight goes up along with the rise in body weight.

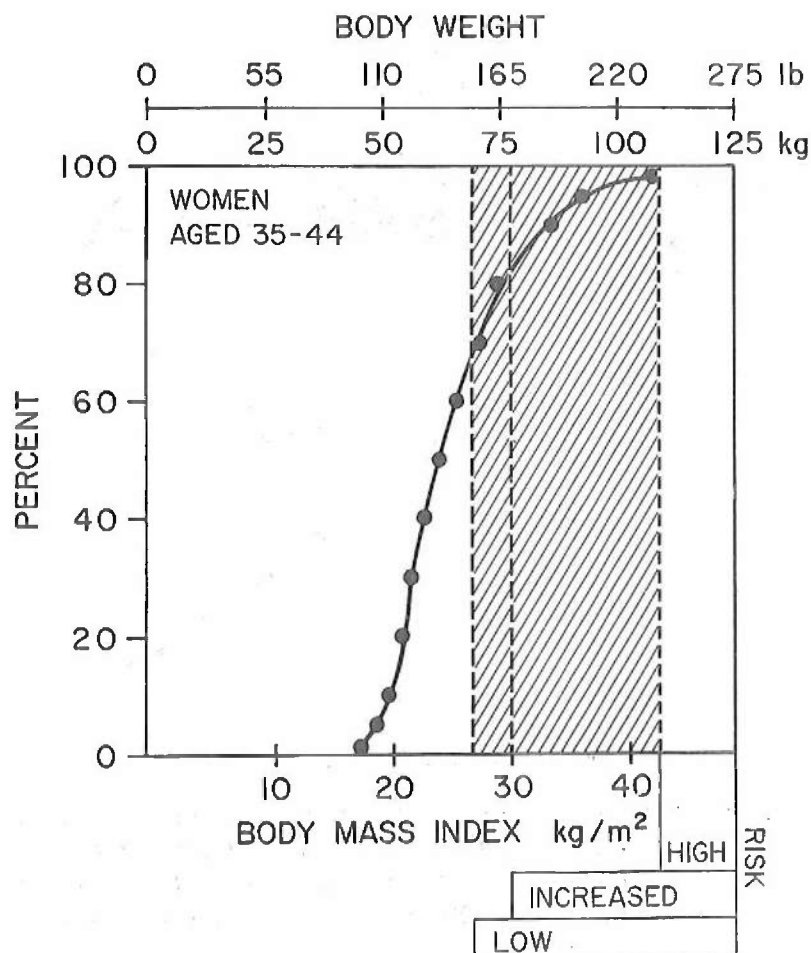


Figure 4: Cumulative body weight of American women. The cumulative frequency of body weights in women age 35–44 is plotted against body weight. The relative risk categories in terms of body mass index are indicated at the bottom of the figure.

## NOMOGRAM FOR BODY MASS INDEX

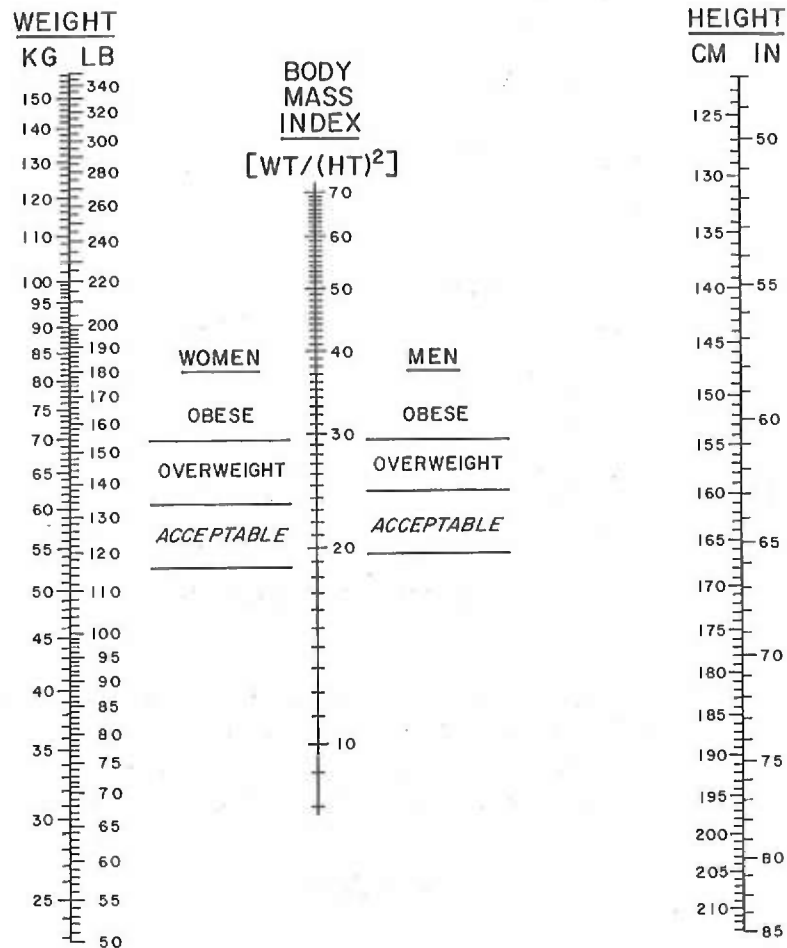


Figure 5: Nomogram for determining body mass index. A line or straight edge is placed between the point showing the individuals weight on the left and his height on the right. The point at which this line crosses the center line is the body mass index. (Copyright G. A. Bray, 1978. Reproduced with permission).

All treatments to be considered in dealing with obese patients should be evaluated in terms of the degree of obesity and its attendant risk.<sup>9</sup>

### HIGH RISK TREATMENT

Fasting or the zero calorie diet as an approach to treating obesity has been in use for over 20 years. Figure 6 is from a study on fasting patients performed by Drenick.<sup>10</sup> It shows that the weight lost in the early days of fasting is predominately water. As this early and rapid loss of water slows, the contribution to weight loss made by fat becomes a greater percentage of total weight loss. In the beginning of a fast, metabolism of fat accounts for

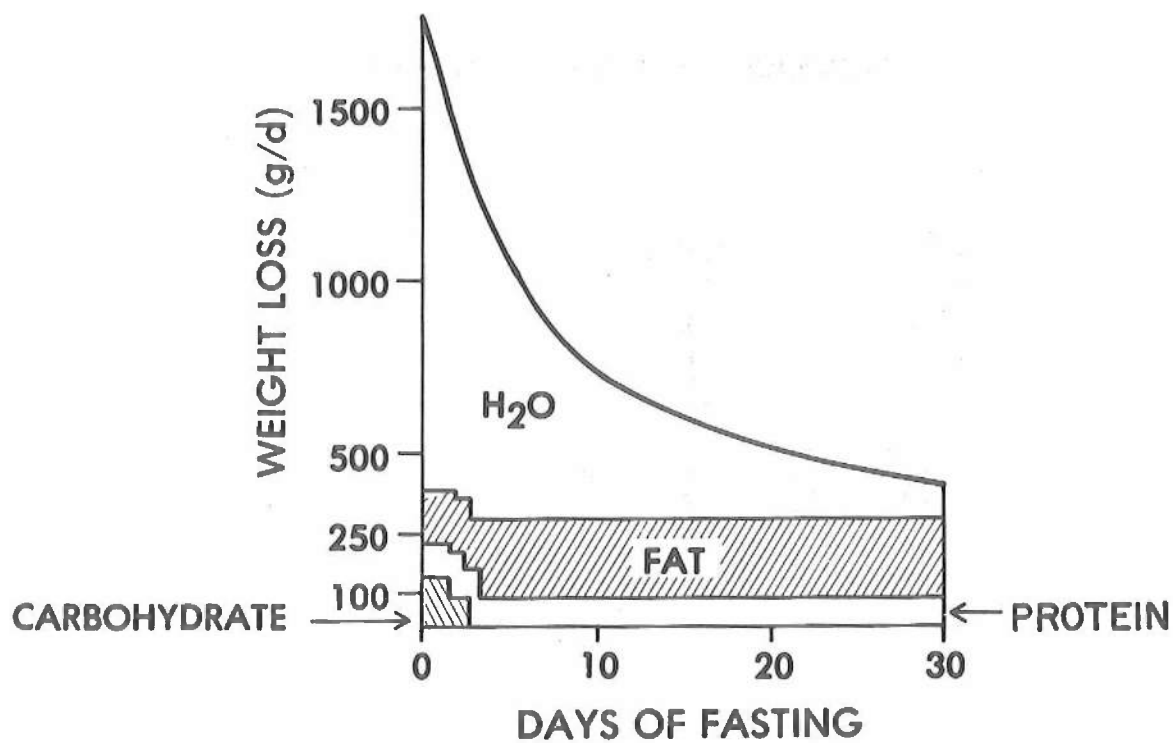
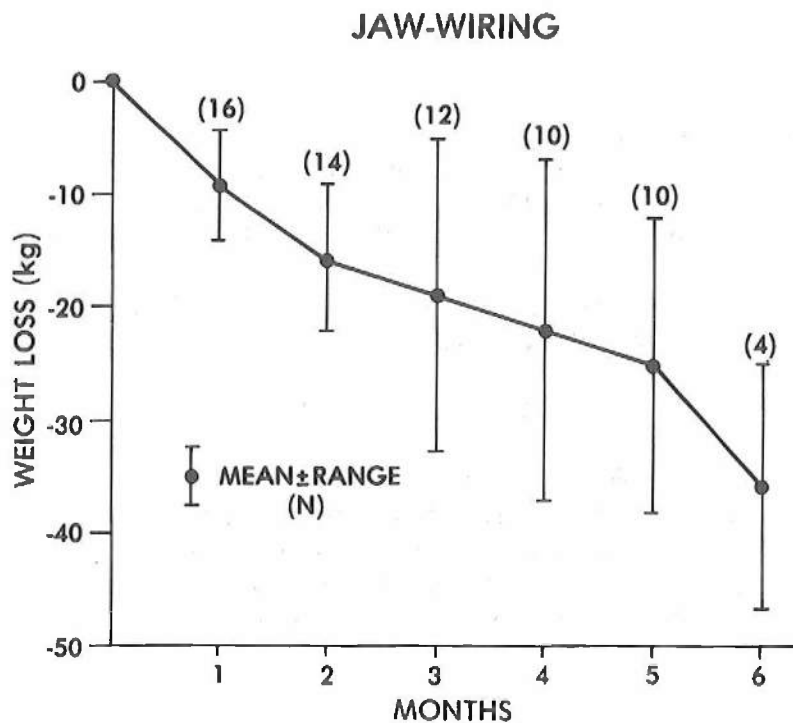


Figure 6: Composition of weight loss during fasting. The fraction of the weight loss due to water, protein, fat and carbohydrate is plotted against time. After the first two weeks or so, most of the weight loss comes from catabolism of fat, although some protein and water is still excreted. (Adapted from Drenick, 1975).



FROM RODGERS 1977

Figure 7: Weight loss with jaw wiring. The number of individuals at each point indicated above that point. The vertical lines are the ranges. (Adapted from Rodgers et al).

only 20% of the weight lost, although providing almost all of the fuel for bodily functions. Gradually the weight lost from metabolism of fat rises to 70%. Against these benefits from fasting is the fact that several deaths have occurred in the hospital during total fasting.<sup>11</sup> Thus total fasting has to be considered a hazardous approach to losing weight.

Very low calorie diets (less than 80 kcal/d) containing only protein may also be a hazardous form of treatment for obesity, since these diets have been associated with a significant number of deaths. Recently, the Center for Disease Control has evaluated 59 individuals who died after or while using liquid protein diets to help them lose weight.<sup>12</sup> Fifteen of these deaths were in women who had no prior evidence of cardiovascular disease. This suggests that fasting or very low calorie diets composed of protein alone can be hazardous and that they are only appropriate for people who have high risk associated with their obesity (Figure 3).

Intestinal bypass and gastric operations for obesity are also high risk treatments, carrying an average mortality of around 3%.<sup>13</sup> On the other hand, these surgical procedures are associated with substantial weight loss which is usually maintained for a prolonged period of time. Two years after the bypass performed on patients initially weighing  $158 \pm 3.3$  kg ( $348 \pm 7.3$  lb) body weights had declined by  $71.1 \pm 3.9$  kg to 44% of the pre-operative level.<sup>14</sup> In addition to losing weight most of these patients became economically and socially rehabilitated. However, in spite of these positive benefits, this procedure must be considered one with a high risk because of the mortality and complications which may occur.

Attaching wires to hold the jaws together limits food intake. Figure 7 shows that when the jaws are wired together, there is a significant weight loss over the period of treatment.<sup>15</sup> In this study, 16 patients lost 20 kg (45 lb) in the first five months. The problem however is that when the wires are taken off, they tend to regain this weight. Moreover, there are the potential risks to the dental structures as well as the hazards of aspiration. In the view of some, jaw-wiring is best reserved for rapid weight loss prior to some other form of surgical therapy. For these reasons jaw-wiring is put in the higher risk group of treatments.

## LOW RISK TREATMENTS

The remainder of this discussion will focus on lower risk therapies including drugs, programs for behavioral change, and acupuncture. These therapies are of particular importance because they are potentially applicable to the large number of people needing help.

### Diet and Nutrition

Many, many diets have been used in treating obesity. All diets attempt to induce the patient to eat fewer calories but the techniques differ.<sup>16</sup> In general, diets can be divided by the number of calories they recommend and whether they recommend a balanced reduction in caloric intake or recommend an unbalanced reduction of caloric intake. Reducing carbohydrate intake lowers caloric (fuel) intake since most fats are eaten along with carbohydrate: for example, cheese is usually put on crackers or with pasta, butter is put on potatoes, etc. Thus low carbohydrate diets are also usually low in calories.

In addition to reducing the level of calories consumed in a diet, all dieters should consider the frequency with which meals are eaten. The frequency with which food is eaten influences both serum cholesterol and glucose tolerance. Young and her colleagues<sup>17</sup> provided identical diets divided into 1, 3, or 6 meals per day. The same foods were provided at all 3 frequencies of eating. When these college students ate either 3 or 6 meals per day, serum cholesterol levels averaged 260–265 mg/dl. When these same individuals ate all of their food as one large meal in the afternoon, serum cholesterol levels were elevated to 306 mg/dl. This highly significant effect of the frequency of eating on serum cholesterol has important implications for the American diet. By changing the frequency with which food is eaten, serum cholesterol might be reduced significantly. This reduction in serum cholesterol by eating meals more frequently has been observed in all of the published studies on this problem.<sup>18</sup> It is thus important to tell the American people that they may expect to lower serum cholesterol by eating 3 meals or more per day.

The frequency with which meals are eaten also influences glucose tolerance. If food is eaten in one meal vs. three or six meals per day glucose tolerance is impaired.<sup>17</sup> There is also suggestive data that eating multiple meals per day is associated with lower body weights than eating one meal per day.

How effective are diets in the treatment of obese patients? A summary of the results of dietary treatments for obesity was published in 1959 by Stunkard and McLaren Hume and marked a watershed in this field.<sup>18</sup> These data are summarized in Figure 8.<sup>19</sup> On average only 5% of people who entered diet clinics lost 40 lb and 25% lost 20 lb. Note, however, that there is a considerable difference between the percentages of people who were successful between these different clinics. That is, some people are more successful than others in losing weight and the clinical setting seems to influence the results. This implies that behavioral factors which might be termed "motivation" play a central role in the success of any treatment.

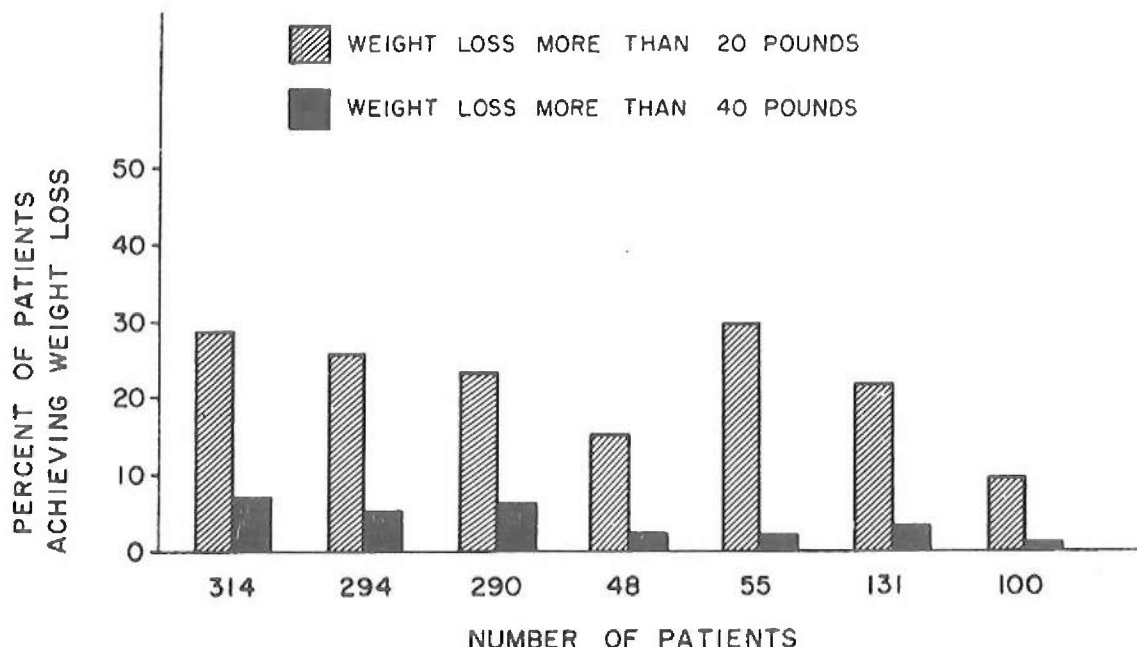


Figure 8: Weight loss during dietary treatment for obesity. The percentage achieving a 20 lb or 40 lb weight loss is expressed for 10 different clinics. (Reproduced from Bray 1970 with permission).

## Behavioral Change

The behavioral aspects of obesity have thus come to the fore along with a variety of therapeutic techniques aimed at producing behavioral changes in eating. One of the experimental supports for these therapeutic techniques is the data on food ingestion which suggest that both qualitative and quantitative differences exist between obese and normal people. For example, obese and lean subjects differ in the quantity of food eaten following an earlier meal with a fixed caloric composition. In one study a drink containing either 200 or 600 calories was given 30 minutes before lunch. The obese subject ate just as many quarter sandwiches whether he got 200 or 600 calories.<sup>20</sup> The lean subjects, on the other hand, ate fewer sandwiches after the 600 calorie drink. Other differences between obese and normal weight subjects have also been identified. These include the greater distractibility of obese individuals, the tendency of obese people to consume more good-tasting food and less bad-tasting food than lean subjects, enhanced ingestion of food under bright lights by obese people and a greater influence of time of day and place on obese subjects' eating.

These studies have led to the development of a series of techniques for helping overweight subjects gain more control over the environmental situation in which they eat. By analyzing eating behaviors, it is sometimes possible to make important changes in the way people eat food. These can be described under 3 headings; (1) Antecedents of eating; (2) Behavior of eating; and (3) Consequences of eating. These are the ABC's of behavioral changes in eating. Details are available in several books<sup>21-23</sup> but the basic procedures are similar. To evaluate the antecedents to eating, patients monitor or record what they eat, and write down the quantities of food eaten.<sup>24</sup> In succeeding weeks they keep additional records of when they eat, with whom they eat, the places they eat, and the activities associated with eating as well as the foods they like and dislike. This provides an assessment of the factors in the environment which trigger or cue eating (Antecedents). This can be done in sequential steps using a card like the one shown in Figure 9 for recording places where eating occurs. From an analysis of these various records, suggestions for changing and controlling eating behavior can be made.<sup>24</sup>

In another exercise patients are instructed to record how frequently they eat, how rapidly they eat, and with whom they eat (Behavior of eating). With this information, it is possible to suggest other changes in eating behavior. For example, patients are encouraged to eat on smaller plates which will reduce the amount of food taken in one sitting. They are also encouraged to cook only one serving at a time. If they want more food, they have to go back and cook it. Serving dishes are not put on the table.

Finally, the patients are helped to understand the consequences of their behavior and develop rewards for successful change. There has to be an important reason if you are to be successful in changing your eating behavior. Obese people need to set up some system of rewards to accomplish this. There are a number of techniques for rewards. One is with money which is paid back for success. There are others like new clothes or a vacation that work as well.

The problem of helping patients count calories has occupied the attention of the Harbor-UCLA Clinic for several years. A recording form on which we have patients write

DAY <input type="text"/>		MONITOR		© GEORGE A. BRAY 1977	
TIME		FOOD EATEN	ASSOC. ACT.	PLACE	M/S
START	STOP				

Figure 9: A recording or monitoring form for noting places eaten. Each time food or beverages are eaten it is recorded as indicated. The place where they are eaten is also recorded. After keeping such records for a week, they are analyzed for the pattern which they provide.

DAILY CALORIE MONITOR		CALORIES		© BRAY 1976
FOOD EATEN	DAY	LIQUID	SOLID	

Figure 10: A Recording or monitoring form for calories. The food and beverages are written down, and the caloric values, obtained from one of several techniques, are also recorded. At the end of a week during which such records are kept, they are analyzed for the pattern of caloric intake.



down their foods and caloric values is shown in Figure 10. We supplement this monitor with a description of how to use the nutritional information available on the labels of many foods. The current form is shown in Figure 11. The caloric (energy) content of a serving size is available for patient use. They only have to weigh or measure the foods.

Recently we have developed a glass calibrated to show the caloric values of various beverages as a technique for continuous monitoring and feedback. The markings on the glass were drawn to provide an estimate of the caloric value for given foods or beverages (Figure 12).<sup>25</sup> Every time an identified liquid is poured into the Calorie Glass<sup>R\*</sup>, the caloric value is immediately visible. This provides a continuous feedback about the caloric value of foods or liquids being ingested. For example, skim milk has 2/3 the calories of whole milk and this difference is registered every time milk is poured into the Calorie Glass<sup>R</sup>. Caloric values of various juices are also provided showing that tomato juice is much lower in calories than most other juices.

The first successful use of behavior therapy for treatment of obesity was published by Stuart in 1967.<sup>26</sup> The striking weight losses in 8 of the 11 patients in this report set off a wave of excitement about the possible uses of behavioral approaches to treat obesity. A recent review has critically compared the results of behavioral and pharmacologic approaches to the treatment of obesity and dampened the enthusiasm of behavioral techniques.<sup>27</sup> The mean rate of weight loss was 67 g/d (0.47 kg/wk) among the 981 patients treated with behavioral techniques and published between 1967 and 1977. This compares with an average rate of weight loss of 71 g/d (0.50 kg/wk) in 2233 patients treated with appetite suppressants whose data were published over the same decade. A summary of these data in graphic form is presented in Figure 13. In one long-term study, Stunkard compared both nutritional and behavioral change with a follow-up in five years. The early results appeared to favor patients in the behavioral program, but with the passage of time, the difference after five years was essentially the same. Still of interest is the fact that some people obviously succeed and others do not, and that some clinical settings appear to be better than others.

### Drug Therapy

Thyroid hormone has been widely used in the treatment of obesity. In 1963 Gordon and his colleagues<sup>28</sup> published a treatment program in which they hospitalized patients for a 48-hour fast then put them on a 1320 calorie diet accompanied by doses of triiodothyronine ( $T_3$ ) which was increased up to a maximum of 125  $\mu$ g/d and injections of a mercurial diuretic. This study lacked a placebo group, that is, a group in which the  $T_3$  and the mercurial diuretic were omitted. A reevaluation of this program including two control groups, one of which received neither  $T_3$  nor mercurial diuretic, has been published.<sup>29</sup> Figure 14 shows the weight loss for one patient receiving both  $T_3$  and the mercurial diuretic. There are two points worth noting. For the first two days in the hospital, the patient was fed a diet similar to the one obtained on the dietary history taken at the beginning of hospitalization. When this patient ate what she said she ate at home, she lost weight. This is typical of the weight loss observed with all of the patients. This early rate of weight loss was as fast as during the subsequent 48 hours of fasting. After this 48 hours, the patients began the 1320 calorie diet, which

\*Calorie Glass<sup>R</sup> and Calorie Cup<sup>R</sup> from Diet Way Products, P.O. Box 5122, Sherman Oaks, CA.

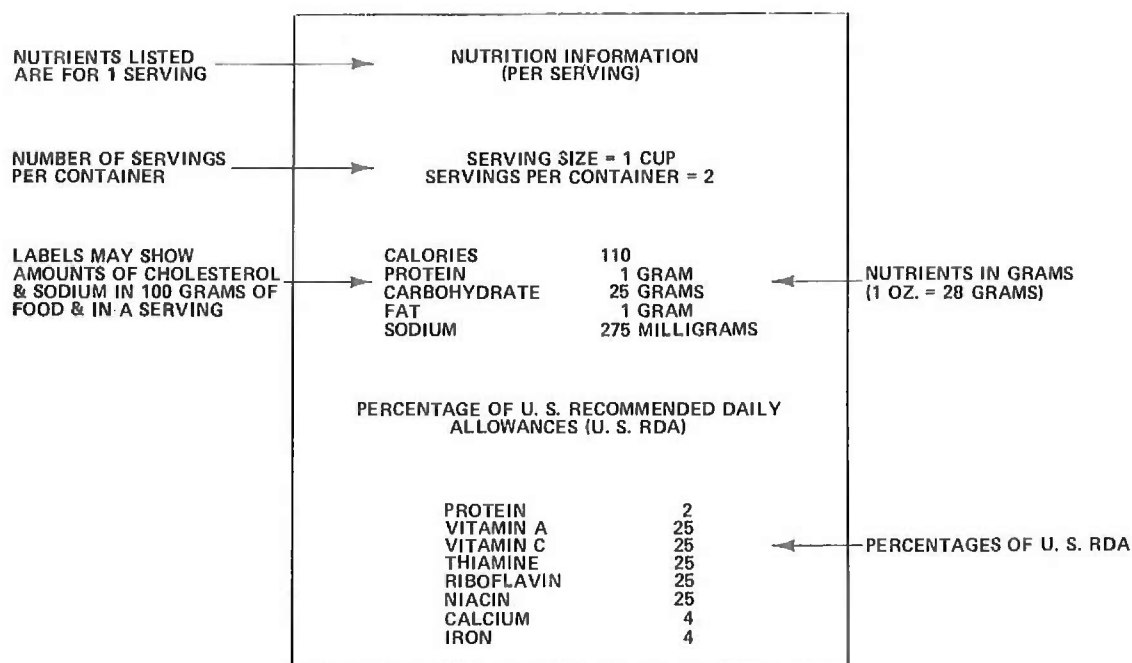


Figure 11: A diagram of the current nutrition label.

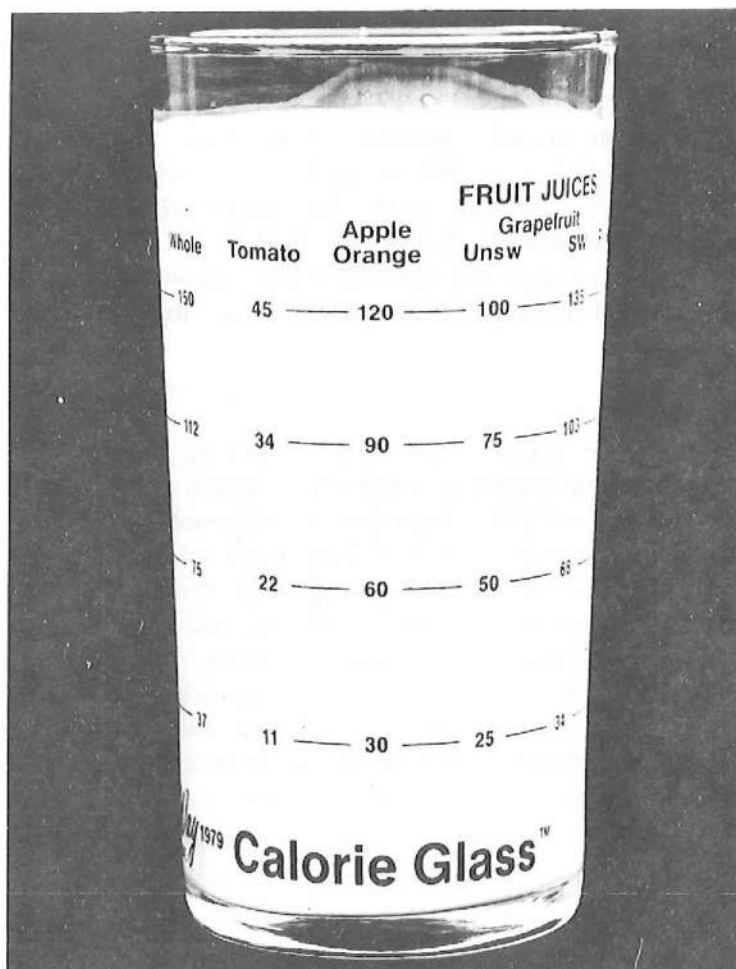


Figure 12: The Calorie Glass<sup>®</sup>. The markings around the glass allow patients to know the caloric value of the liquids which have been poured into the glass, at the same time they may also compare the caloric value of several of the common beverages. It also provides continuing feedback of the number of calories ingested in liquid form.

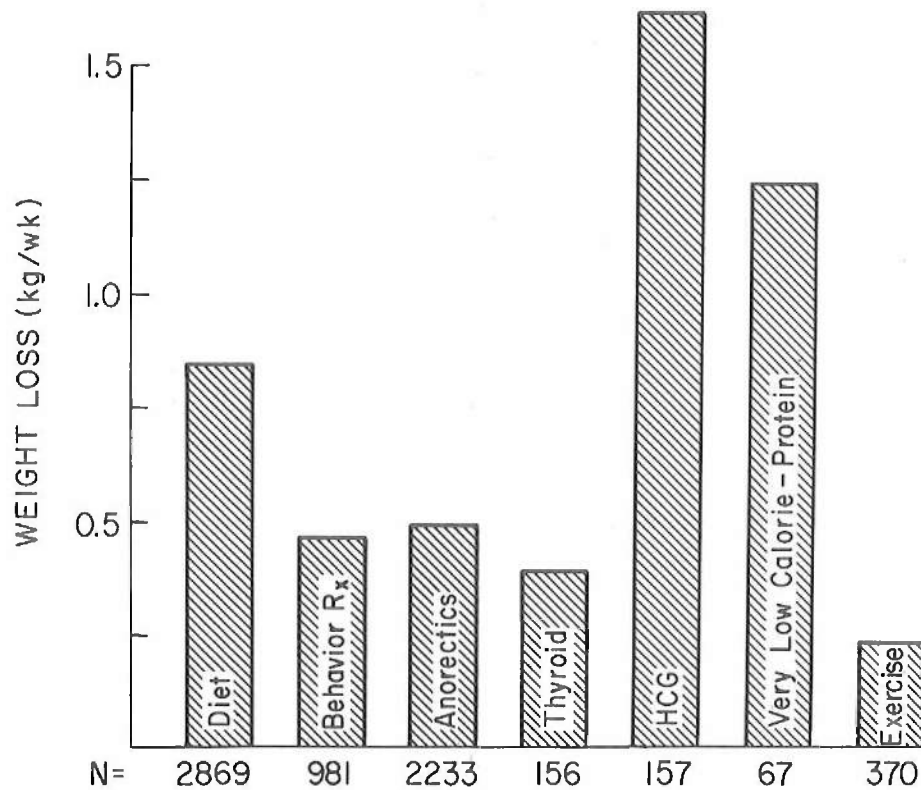


Figure 13: Rates of weight loss during several types of treatment for obesity. Adapted from Wing and Jeffrey with additions. (Copyright G. A. Bray, 1979, reproduced with permission).

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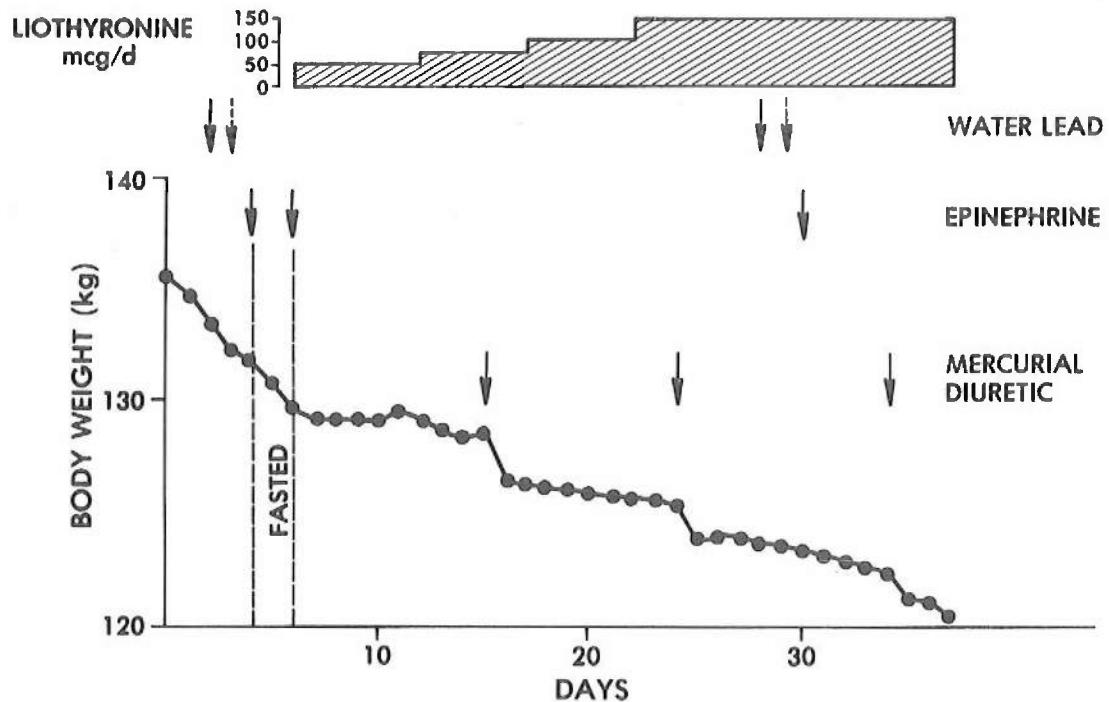


Figure 14. Weight loss in patients hospitalized for a trial with a 1320 calorie diet supplemented with triiodothyronine and mercurial diuretics.

was continued for 28 days. Triiodothyronine was started at low doses and increased gradually to 125  $\mu\text{g/day}$ . The course was punctuated by two injections of mercurial diuretic. With each injection, fluid, and thus weight, were lost and there was no compensation in the following days. This suggests that some of the water produced by metabolism of fat had not been excreted in the preceding days. Figure 15 shows the weight loss for the entire 28-day period for each of the three groups. The patients treated with the total program lost most weight expressed either in absolute terms or relative to body weight. The other two groups lost more slowly.

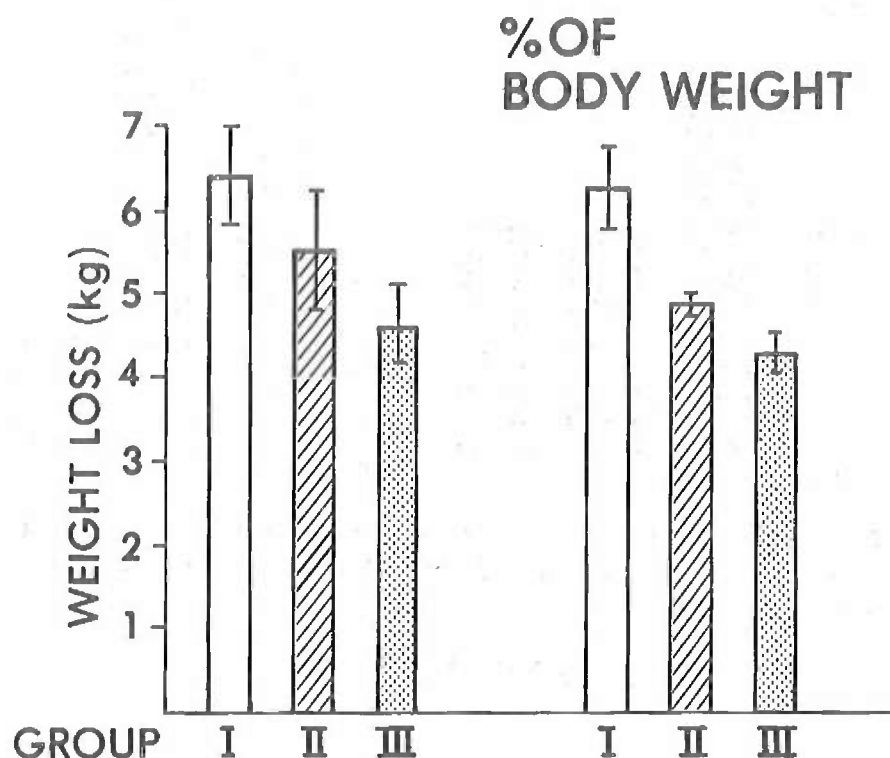


Figure 15. Summary of in hospital dietary program. Weight loss is expressed both in terms of percentage of weight lost and absolute weight lost. With both comparisons the individuals receiving the entire program lost the most weight.\*

\*Figure 15 is from Bray, G. A. Thyroid Hormones in the Treatment of Obesity. In: Obesity in Perspective (ed. G. A. Bray) DHEW Publication No. (NIH) 75-708, pp. 176-186, 1976.

The use of  $T_3$  for treatment of obesity has also been carried out with outpatients<sup>29</sup> including a controlled double-blind trial of  $T_3$  and placebo published from our laboratory. The design was a crossover with two treatment periods of four weeks each, with two weeks on no medication in between. The triiodothyronine (225  $\mu\text{g}/\text{dl}$ ) was given either before or after the placebo. Thus all subjects received both placebo and  $T_3$ . Weight loss with triiodothyronine averaged 140 grams per day. During the treatment with placebo there was actually a weight gain of 112 grams per day. These subjects weighed an average of 30 to 40 kg more than did those in the first in-hospital study. In addition the outpatients were given 1000 calorie diets rather than 1320 calorie diets used in the hospital. The smaller weight loss for the outpatient group indicated that they were not adhering to the diet as well as the hospitalized patients and thus use of  $T_3$  was not effective as with inpatients. Indeed the outpatients treated with  $T_3$  lost weight more slowly than any of the placebo groups in the hospital. Moreover the outpatient group treated with placebo actually gained weight whether the placebo came before or after the treatment with  $T_3$ .

The appetite suppressants are a second group of pharmacologic agents. All of them are derived from phenethylamine except one. Phenylpropranolamine (PPA) is the only member of this group available without a prescription. It can be purchased in a variety of different capsules which contain PPA alone or in combination with the methylcellulose, benzocaine, or caffeine. The oldest of the prescription drugs is dextroamphetamine. In the mid-1930's this compound was incidentally observed to induce weight loss. However, d-amphetamine was associated with significant central excitatory effects and with numerous cases of addiction. Over the years, the organic chemists have synthesized many derivatives of amphetamine. The clinically available compounds show considerable variation in the central excitatory effects, but are all appetite suppressants. This dissociation of central excitatory properties has been shown using EEG tracings in subjects given fenfluramine, amphetamine, and barbiturates. The effects of fenfluramine on the electroencephalogram were like those seen with the barbiturates, and were very different from the effects seen with amphetamines.<sup>30</sup> Thus the organic chemist has been successful in separating the central excitatory properties from the appetite suppressing activities of these molecules.

Do appetite suppressants work? The evidence supporting the effectiveness of these drugs has been reviewed by Scoville<sup>31</sup> and by Sullivan and Comai.<sup>32</sup> In the review of applications submitted to the FDA, Scoville reported that drug-treated patients lost an average 0.51 lb/wk (0.22 kg/wk) more than the placebo-treated control groups. A graphic presentation of this effect is shown in Figure 16. Using mazindol, the patients on the active drug during the treatment period lost more weight than the placebo-treated patients. Thus mazindol was significantly more effective than a placebo for this group of individuals.<sup>33</sup>

During the past decade three new appetite suppressing drugs have been marketed: Fenfluramine (Pondimin<sup>R</sup>); mazindol-(Sanorex<sup>R</sup>); and clortermine (Voramil<sup>R</sup>). As noted above, behavioral change therapy has also been popular during this same time. To increase practical experience with these two approaches, our clinic has conducted two clinical trials. The first trial examined a behavioral program, a placebo, and two appetite suppressing drugs.<sup>34</sup> There were no charges to patients for participating in this study and all patients were given a 1000-calorie diet. There were two goals. The first was to evaluate predictive factors that might identify prospectively those patients who were going to be successful during the course

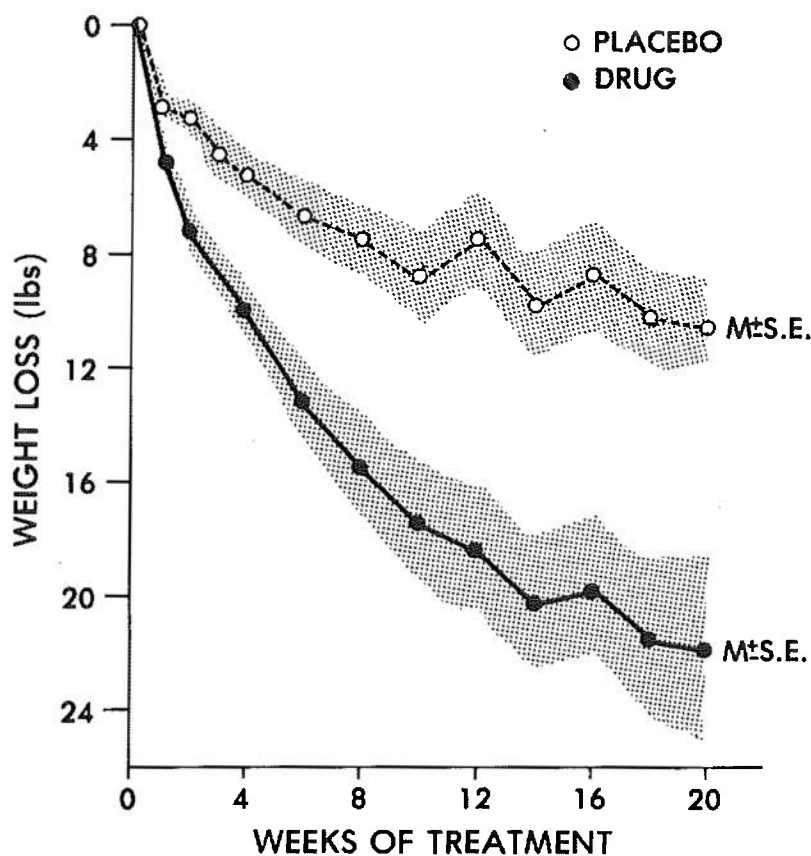


Figure 16: Effect of appetite suppressants. This double blind trial compared both an active anorectic drug and a placebo. The drug-treated patients lost more weight over the entire 20 weeks of the study.\*

\*Figure 16 is from Bray, G. A. The Obese Patient. Major Problems in Internal Medicine, Vol. 9, Philadelphia, PA, W. B. Saunders Company, 1976.

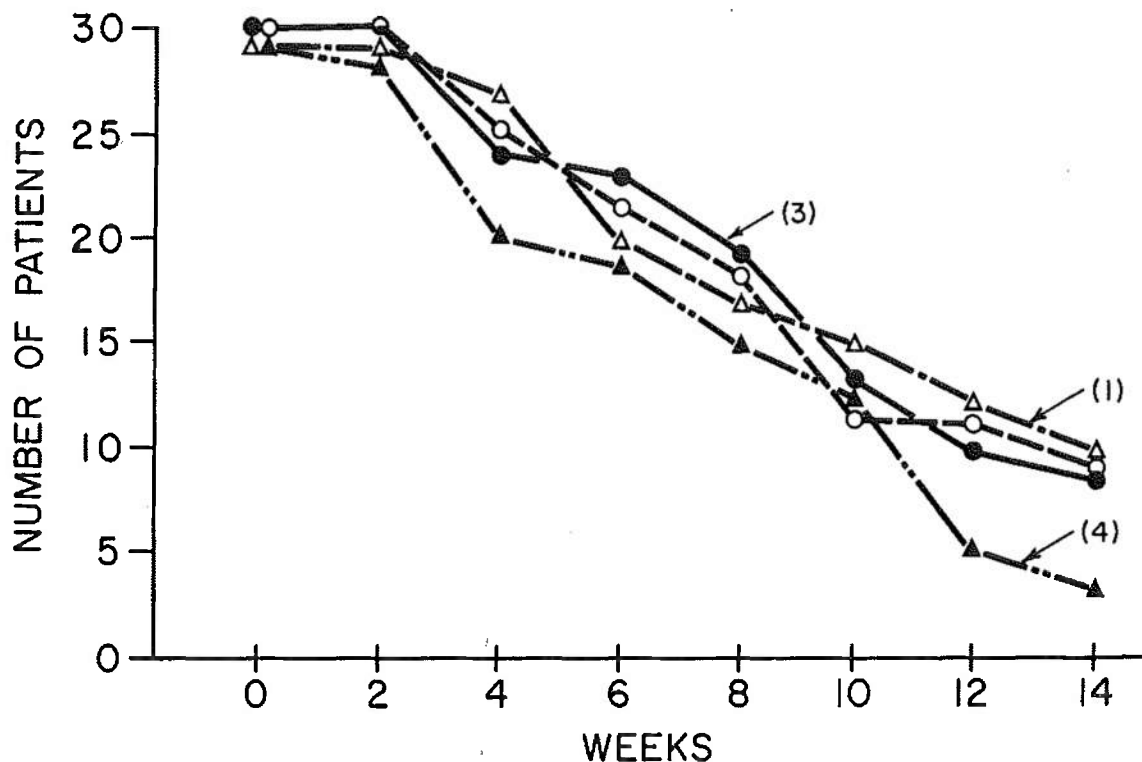


Figure 17: Clinic Drop-Outs. The number of patients remaining in treatment is shown at each visit. All four treatments were essentially the same in the rate at which patients dropped out.

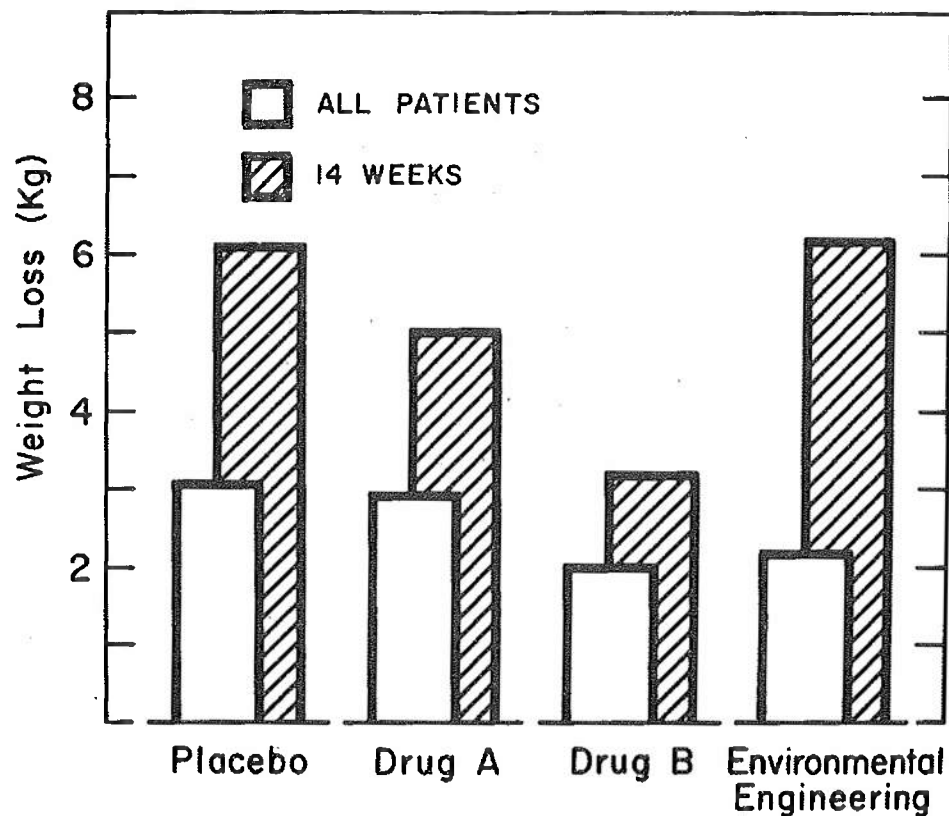


Figure 18. Weight loss comparing placebo, behavioral program and two drugs. Over both the full length of the study, and the shorter period during which individuals were seen, the placebo and behavior program patients did as well or better than those on the anorectic drugs.

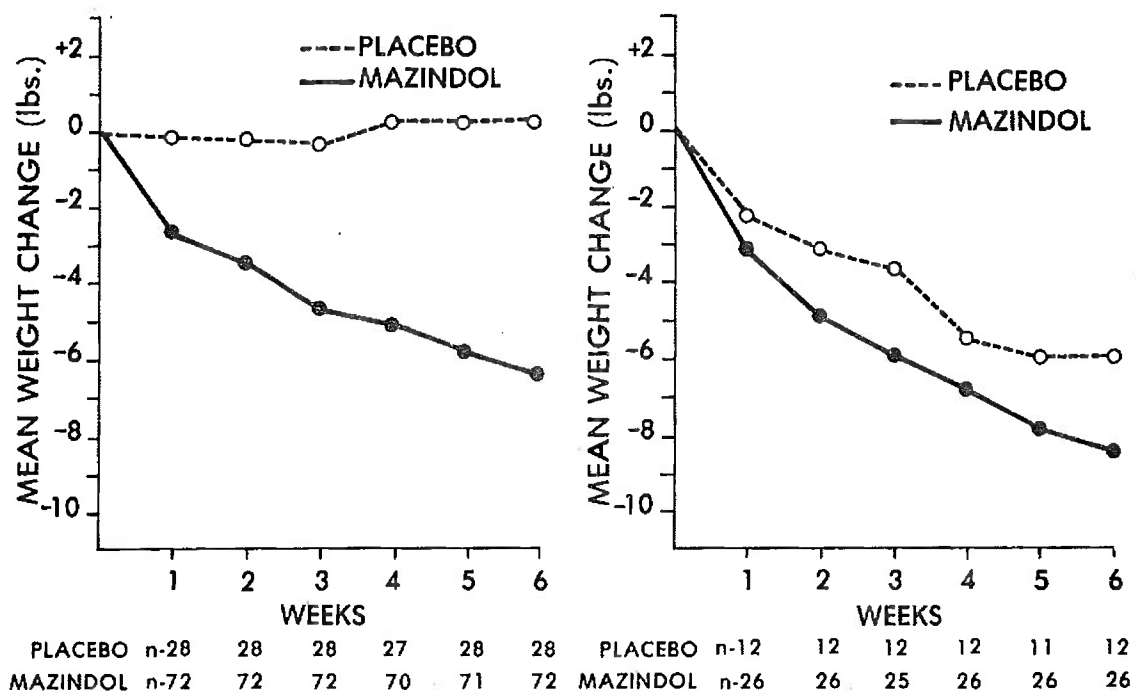


Figure 19: Comparison of weight loss in clinics with and without a behavioral program. The left-hand panel is the weight loss of four clinics which used the appetite suppressant or placebo alone. The right-hand panel shows the effect of superimposing a behavioral program for all patients.

of the program. Second, we wanted to compare behavioral treatment with drug treatment in terms of weight loss and duration of attendance at the clinic. A total of 120 patients were started on the program. The two appetite suppressants were mazindol (Sanorex<sup>R</sup>) and diethylpropion. Figure 17 shows the number of patients remaining in the clinic with time after starting the study. The drop-out rates were essentially identical for the four treatments with about half of the patients still in treatment after eight weeks.

Before beginning the specific treatment, each patient completed a variety of pencil and paper tests. The tests included measures of self-esteem, social acceptance, locus of control, responsiveness to stimuli, attitudes toward weight loss, and knowledge about nutrition. Success was related to social conformity and a desire for social acceptance. Locus of control and self esteem were not related to success. Individuals who believed that poor eating habits caused their obesity also tended to be more successful. Finally success was more likely in those who were less responsive to environmental cues.<sup>34</sup>

Weight loss for the full 14 weeks and for all patients at the time where they dropped out of the program are shown in Figure 18. Patients in the behavioral program and the placebo groups lost weight as well as, or better than, those in the drug-treated groups. These findings strengthened our interest in behavioral change. The success of the placebo-treated groups also intrigued us. On the other hand, the high drop-out rate was discouraging because it probably reflected failure for the people who dropped out.

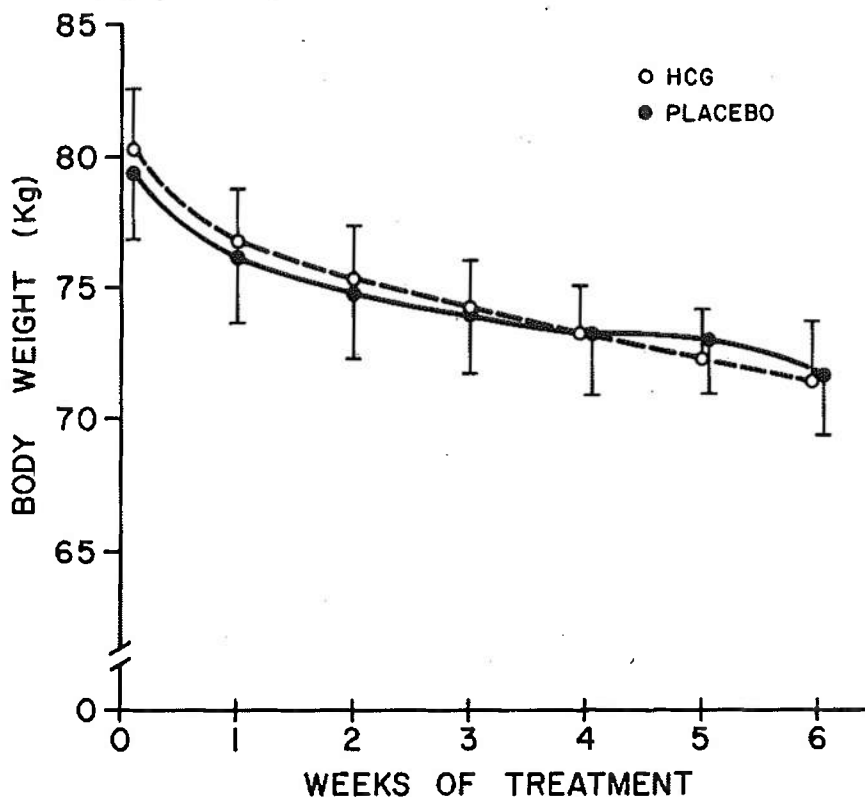
A second study compared appetite suppressing drugs with behavioral change therapy. This was a much more sophisticated study design.<sup>35</sup> Each treatment group had 12 patients, four on placebo and eight on drug. There were five replicates of this basic grouping. Each replicate of 12 patients was assigned to one of five therapists and each therapist thus got a complete block of 12 patients. The use of five different therapists gave us a chance to address the question of whether physicians or non-physicians are better therapists. Patients paid a refundable fee for participating in the clinic, whereas the first study had no charges. Patients were asked to pay \$50 which was to be returned to them in two installments, half at the end of the treatment period and the other half, two months after the end of the study, when they returned to be weighed. This study was one part of a five-hospital study. The data from the other four hospitals are shown on the left of Figure 19, the data from our clinic on the right. All patients in our clinic participated in a behavioral program designed collectively by the five therapists. This behavioral program made our study different from the other four clinics, none of which had a behavioral program. In the other clinics, the drug-treated patients lost an average of six pounds. In our clinic, the placebo-treated patients lost almost as much weight as the drug-treated patients in the other four clinics. Calculations of weight loss show that drug-treated patients in our clinic lost about 60 grams/d and the placebo-treated group 40 grams per day. Thus the placebo group lost about four times as much weight as the placebo-treated group in the other clinics.

### Chorionic Gonadotropin

In 1954 Simeons introduced the use of injections of human chorionic gonadotropin (HCG) into the treatment of obesity.<sup>36</sup> Several recent controlled trials of HCG and an appropriate placebo have been conducted to evaluate its effectiveness.<sup>27,37</sup> The data in Figure 20 show



the changes in body weight of the patients who participated in the clinical trial conducted in our clinic. All patients were given a balanced, very low calorie diet (550 kcal/d). The two groups of patients treated with either placebo or HCG lost weight at almost identical rates; those treated with HCG lost an average of 8.8 kg, the placebo-treated group 8.1 kg. When calculated in grams-per-day the HCG-treated patients lost 210 grams/d, and the placebo-treated patients lost 193 grams/d, both of which are well above the rate of weight loss for any of the placebo-treated patients studies in out-patient trials. These rates of weight loss are close to that of massively obese inpatients eating 900 kcal/per day. Four other programs using HCG show similarly striking effects. Only a few dietary or behavioral studies show such rapid weight loss. The very low calorie diet composed primarily of protein are in this category, but the recent untoward effects with one of the programs urges caution in their use.



**Figure 20.** Weight loss during treatment with HCG or placebo. During the six weeks of this study, the patients treated with human chorionic gonadotrophin (HCG) or placebo lost weight at comparable rates. These rates of weight loss, however, were significantly more rapid than with most of the other treatments discussed.

To what is the placebo effect in the HCG study to be attributed? There are two possibilities. The first is that the daily visit to the therapist's office to get the injection was a potent motivating factor. There is some evidence to support this idea. In a study where injections were given at home by the patients or only three times a week, the weight loss was slower. A second possibility is there is some effect of injection per se. Recent studies have focused attention on the endogenous peptides which serve to modulate painful stimuli. The enkephalins and endorphins which have this opiate-like property are present in the pituitary, brain, and peripheral nervous tissues. Injections of these peptides or their inhibitor are known

to modify food intake. It is conceivable, although without any direct support, that the injection of a placebo might relieve hunger through the release of endogenous enkephalins. In all five of studies with HCG, the placebo-treated patients lost weight more rapidly than all but four of the other 70 from the literature using a variety of modalities. Thus injection placebos may have a place in the treatment of obesity.

## Acupuncture

Acupuncture is the final method that was evaluated. This study was done without prescribing a diet.<sup>38</sup> The theory of acupuncture is that there is a spot on the ear lobe where the insertion of a needle before eating will reduce food intake. In this study the acupuncture was done by a Chinese physician who is an anesthesiologist and who has had previous experience with acupuncture. He put needles in one or two active sites and in an inactive site. The weight loss in the group receiving acupuncture was 24 grams per day; the placebo group lost no weight. The variability among patients, however, made this difference statistically not significant. The conclusion of this study was that when acupuncture works, it works because of adherence to the diet with which it is used; acupuncture alone was ineffective.

## DISCUSSION

Several general points emerge from this review of modalities used in the treatment for obesity. First, all of the treatments with low risk are successful for some patients. These beneficial effects however last for variable periods of time with long term results that are often disappointing. Like most other chronic problems in clinical medicine, treatment of obese patients is largely a problem in compliance. Some patients drop out in all treatment programs near the beginning but most will achieve some progress toward their goal. Only a small number of patients however will maintain the weight which is lost. Second, the fraction of patients who will achieve weight loss for a long period of time seems to vary from one clinic to another suggesting that such things as the skill and experience of the therapists, the design of the program and the techniques used to motivate the patient are all important variables. Third, non-physicians can do as well as physicians under many circumstances. Fourth, the successful patients cannot yet be predicted with any success using pencil and paper tests, but there are some suggestive leads from measurements involving responsiveness to external stimuli.

The use of very low calorie diets have had periods of popularity throughout this century and are "in vogue" now. Evans and his colleagues more than 40 years ago recommended the use of very low calorie diets as a modality for treating obese individuals. This idea gradually lost favor. However, nearly 20 years later, liquid diets were introduced and became commercially successful. Metrecal<sup>R</sup>, one of the first products, had a meteoric rise in popularity and then fell into disfavor. More recently, the use of very low calorie diets, in which protein is the principal nutrient, have been developed and commercialized in several forms. The evidence is clear that with all of the programs now in use, patients can lose up to 200 g/d or slightly more. This equals the rates of weight loss seen in patients treated with the chorionic gonadotropin or the corresponding placebo and encouraged to adhere to a 550 kcal/d diet. The unfortunate series of deaths with the use of very low calorie diets in which the protein was obtained from hydrolyzed collagen (liquid protein) has raised a cautionary note in the

use of any very low calorie formula diet. Although the deaths associated with ingestion of liquid protein diets may have been related to the quality of the protein or to a deficiency of one or more micro-nutrients in the diet, they may also have been due to the effects of a diet in which inadequate carbohydrate or fat was provided. It would thus seem prudent to incorporate some carbohydrate and possibly a small amount of fat with unsaturated fatty acids into any formula. At least two of the programs which use formula diets add small amounts of carbohydrate. Whether there are special properties of one dietary component over another in such formula preparations has not yet been established, and whether these newer very low calorie formula diets are more efficacious than Metrecal, which had its meteoric rise and fall 20 years ago, is also not known.

Although we have examined dietary elements in an isolated fashion, it is often possible to provide more than one of these components together. Thus, anorectic drugs can be used along with a good low calorie well balanced diet. Similarly, programs focusing on behavioral changes can go hand in hand with nutrition and dieting. The use of exercise or other programs to increase movement, can be used with any of the programs. From a practical point of view, it seems best to have a multi-faceted program in which there are several starting points for different patients. Such a strategy provides the possibility for varying the subsequent treatment program. In our clinic we have four different phases which we believe can all be used profitably. We have been impressed with the rapid weight loss and high adherence of placebo treated groups given small injections of saline in the HCG program. We are currently examining the possibility that injections of other substances might enhance weight loss, or that injectable vitamins might be given during an initial period of rapid weight loss. The second and third phases of our program focus, respectively, on nutrition and behavioral changes in eating. For many patients one or more of the techniques which they learn about in such a program can be useful in continuing to lose weight, and some of these have been outlined elsewhere.<sup>2,4</sup> Finally, we believe that formula diets can be very useful for additional short periods where rapid weight loss is desired. From the work which is in progress in our laboratory there are several possible formulations which provide the essential elements of nutrition as well as helping people to lose weight. For some massively overweight individuals this group of low risk therapies is inadequate. For them the use of surgical procedures is carefully evaluated, and when the individual is interested they may be undertaken.

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## ALCOHOL CONSUMPTION

### ITS EFFECTS ON CALORIE INTAKE AND DIETARY PATTERNS

Cynthia Dubose

General malnutrition and specific dietary deficiencies in "alcoholics" are common occurrences. However, the effects of "social drinking", or moderate alcohol consumption, on nutrition and the diet are less clearcut, and not as much attention, until recently, has been focussed on this aspect of the diet. Perhaps it was assumed that alcohol played a minor role in the average person's daily intake and consequently did not contribute significantly to total caloric intake.

However, it has been estimated that alcohol accounts for 210 kcal/day/person in the United States,<sup>1</sup> and on the average for 10 to 20 percent of the total caloric intake of American adults.<sup>2</sup> Clearly, even for moderate drinkers, alcohol may be a substantial part of the diet and, consequently, has significance in terms of nutritional adequacy of the diet, caloric intake, and the maintenance of a stable body weight.

In terms of health, alcohol seems to have both beneficial and deleterious effects. Some recent studies have cited the beneficial and protective effects of moderate alcohol consumption on the risk of heart attack and coronary heart disease<sup>3,4</sup> although other evidence does not confirm these findings.<sup>5</sup> Alcohol has been used in clinical medicine for years to stimulate appetite and even to treat diseases, although it is generally agreed that thorough evaluations of these therapeutic uses of alcohol have not been done.<sup>6</sup>

The present advice to the public concerning alcohol consumption given by the U.S. Department of Agriculture and the U.S. Department of HEW is, "if you drink alcohol, do so in moderation."<sup>7</sup> While the guidelines emphasize the variety of serious conditions that are caused by heavy drinking and warn that "alcoholic beverages tend to be high in calories and low in other nutrients", they conclude that "one or two drinks daily appear to cause no harm in adults". Nonetheless, even such moderate drinking can have significant impact if 200-400 alcohol calories are added to one's normal daily intake or if they replace a comparable number of nutrient calories.

The topic of alcohol and its relationship to diet has been the subject of recent reviews and reports.<sup>6</sup> The aims of the present paper are to discuss briefly the general topic of alcohol's role in the diet and to discuss the issue of advising moderation in the use of alcoholic beverages in the particular context of the Military.

#### Alcohol's Effect On the Diet

Among the many factors influencing a person's eating patterns, and even his dietary needs, is his appetite. Studies have shown that weak concentrations of alcohol tend to increase gastric motility and have a stimulating effect on appetite, and strong concentrations decrease gastric motility and depress appetite.<sup>8</sup> In the heavy drinker, decreased desire for food is one factor

causing the decreased food intake that is often observed. In addition, it is well known that there are many other factors, including nutritional deficiencies (caused by poor intake and by malabsorption and poor utilization of essential nutrients), diminution of taste sensitivity, and a host of social and behavioral factors. While situational variables influence any person's eating behavior, they are probably even more influential in the case of the heavy drinker.<sup>6</sup>

Many factors also influence the diets of moderate alcohol consumers, including availability of certain nutrients, appetite, alcohol calories, and social and behavioral variables.

Some studies have shown that moderate drinking does not decrease food intake. Bebb et al<sup>9</sup> studied the diets of 155 nonalcoholic men and women by means of an intake diary. They observed that the actual intake of grams of protein, fat, and carbohydrate increased slightly, for the average subject, on days when alcohol was consumed. Comparison between subjects who on the average consumed 5% or more of their total calories from alcohol and those who consumed less than 5% of their calories from alcohol showed no difference in the quality of their diets; that is, in terms of the distribution of subjects within a group consuming specific levels of RDA of calories, protein, thiamin, riboflavin, vitamin A, iron, ascorbic acid, and calcium, there was no difference between the groups.

In the study reported by Belfrage<sup>10</sup> in which ethanol was experimentally administered daily to volunteers for 5 weeks, there were no significant differences in dietary patterns between the control period and the ethanol period. The intakes of fat or protein did not change and only a slight increase in carbohydrate intake (which they attribute to the beer — the form in which the ethanol was taken) was observed.

In these studies of nonalcoholics, results show that the alcohol calories in the diet were merely added to the food calories and did not change the food pattern greatly. Bebb and his coworkers<sup>9</sup> reported that when their subjects were classified into categories of increasing percent of calories derived from alcohol, there was a corresponding, progressive increase in their average total daily caloric intake. In a study of Finnish subjects using dietary survey<sup>5</sup> over a 10 year period, Hasunen et. al.<sup>11</sup> reported that subjects with high alcohol intake (over 30 g/day ethanol) had higher total caloric intakes than subjects in a control group who had low alcohol intake and concluded that moderate alcohol intake may not have "any particular effect on food consumption or nutrient intake" other than adding calories.

Roe<sup>6</sup> has enumerated specific circumstances in which alcohol consumption may lead to caloric excess. One is when drinkers frequently attend cocktail parties or other social occasions where snack food is also served. High calorie snacks which are frequently eaten with high calorie cocktails add considerably to caloric intake. Another situation is when subjects under experimental conditions are deliberately invited to consume alcoholic beverages as an addition to their daily diet. For example, the subjects observed by Belfrage<sup>10</sup> increased their total caloric intake by 17% due to the ethanol administered during the study and had increases in body weight of 1–3 kg during the 5 week study. The other circumstances are when it is the cultural norm to drink wine at or between meals and when alcohol abusers are exposed to situational factors at work which encourage multiple eating and drinking occasions during the course of the day. In regard to the last point, several authors emphasize that alcoholics



are not always stereotypic underweight, malnourished people; in fact, two types of alcoholics have been observed: those who are thin who drink and do not eat, and those who are fat, who drink and eat.

Despite the evidence cited about caloric excess associated with alcohol consumption and the very widespread consumption of it in this country and throughout the world, there is little evidence that alcohol is directly related to obesity. Roe<sup>6</sup> has concluded that the occurrence of obesity in nondrinkers, drinkers, and alcoholics is related to sociocultural factors which influence physical activity, eating patterns, and drinking habits. She found an interaction between socioeconomic status and drinking habits in the occurrence of obesity. In her sample population, obesity in women was most common in nondrinkers of low socioeconomic status, while in men obesity was most common in alcoholics of high socioeconomic status.

Nonetheless, due to its high caloric content (7 kcal/g) and the so-called empty calories derived from it, alcohol is prohibited in most weight-loss programs. Generally, people are poorly informed about the caloric content of alcoholic beverages and often express surprise when told about their high energy content. Many authors dealing with diet and health warn that even the moderate use of alcohol can have a significant effect in terms of promoting overweight. The U.S. Dietary Guidelines<sup>7</sup> state that even moderate drinkers may have to drink less to achieve ideal body weight, and they advise avoiding "too much" alcohol if one is trying to lose weight. Farquhar<sup>12</sup> suggests that alcohol consumption be limited to at most 10% of total caloric intake because alcohol "may add to weight control problems and may displace valuable nutrients".

The displacement of valuable nutrients, in addition to caloric excess, is another major concern in regard to alcohol consumption. The displacement of nutrient food calories by empty alcohol calories is particularly common in the heavy drinker but may also occur and affect the diets in other drinkers.

Numerous studies of the food intake and nutritional status of heavy drinkers have shown that vitamin and mineral deficiencies and protein and general malnutrition are common. These conditions are due not only to the many situational factors influencing eating behavior and to missed and partially eaten meals,<sup>6</sup> but also to the impaired absorption and use of some essential nutrients. Even in moderate drinkers, the intake of alcohol can reduce the consumption of nutritious foods and can also limit the availability of certain nutrients. It has been suggested that moderate drinkers be particularly careful to eat a variety of foods, balance the foods eaten, and compensate by eating foods rich in important nutrients and avoiding low-nutrient snack foods.<sup>13</sup>

### **Alcohol and Nutrition Education**

The information we have from surveys and studies of population samples indicates that alcohol consumption, even to a moderate degree, is a significant aspect of the diet in terms of excess calories and nutrient adequacy. Excessive and/or very frequent alcohol consumption can potentiate these problems and can also lead to the other serious problems associated with alcohol abuse.

Research shows that the consumption of alcohol per capita in the United States is increasing. Between 1960 and 1973, alcohol consumption increased 36%,<sup>14</sup> and the rate of increase was particularly high among young people.<sup>15</sup> The consequences of this trend on the resulting diet and health of these alcohol consumers are of concern to nutrition educators. At this time, when many people are extremely interested in nutrition and are seeking advice on the topic, the effects of alcohol on an individual's daily diet should be emphasized, and perhaps some modifications to the dietary regimen should be recommended.

There are some situations and segments of the population in which alcohol consumption is especially prevalent and, therefore, where education about alcohol is particularly important. Military duty is an example of such a situation. According to a recent report on alcohol abuse in the Armed Services,<sup>16</sup> the present military environment is such as to actually encourage excessive use of alcohol. Factors such as the nature of the job assignment (intensive physical and mental training, isolation, and boredom), and the wide availability and low cost of alcohol contribute to this environment. The use of alcohol is also frequently encouraged to bolster the spirit of comradeship and manhood. In addition, attitudes of personnel tend to be permissive toward overindulgence; for example, it has been reported that "getting drunk once in a while" is considered by most respondents in a survey of servicemen to be acceptable personal behavior and acceptable behavior for others.<sup>16</sup>

The problem of alcohol abuse in the military is a complex one, complicated by the atmosphere, attitudes, and policies. Information about the effects of alcohol on nutrition and health is certainly a necessary and important part of programs dealing with the treatment and prevention of alcohol abuse. However, the topic should also be incorporated into other educational programs dealing with nutrition where it is currently neglected. In the Armed Forces, as in most segments of society, alcohol has become a significant aspect of daily intake, and its consequences on the diet should be emphasized. The major message concerning alcohol consumption, according to the present guidelines, is moderation. In nutrition education programs aimed at individuals in whom overweight is a problem, special attention should be paid to communicating the contribution of alcohol calories, as well as of food calories to the total energy input.

Education alone will not effectively promote moderation in alcohol consumption if the environment tends to encourage excessive use of alcohol. Altering the environment by decreasing the availability of alcohol and deemphasizing its use as a response to social and job pressures may make the atmosphere more conducive to moderation. Studies have shown that availability (factors including abundance, low cost, and advertising) effectively encourages excessive use of alcohol,<sup>17</sup> which can lead to increased incidence of alcohol abuse and its consequences. An effort to promote moderation in alcohol consumption could be directed in several ways: by putting emphasis on recreational activities other than drinking; by encouraging freedom of choice between alcohol and nonalcoholic beverages in service clubs; by changing the economy of low-cost alcoholic beverages; and by clarifying the policy toward alcohol use.

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## EXERCISE AS AN ADJUNCT TO DIETARY MODIFICATION IN THE PREVENTION OF DISEASE

Dennis M. Kowal

During the past century in this country, people have radically reshaped the environment in which they live. Labor-saving devices of all kinds have assumed an increasing amount of work formerly performed by muscle power. In most cases, these changes were for the better, but they have also created some major problems. One of these problems is that the human body, originally designed for physical work, has had to adapt to an increasingly sedentary world. These events must have occurred without an appreciation of the fact that regular exercise is necessary if the body is to function effectively. Considerable risk is involved if we do not attend to this advice. Some of the consequences are a reduction in the capacity of the cardiovascular system, obesity, malnutrition, or increased risk of contracting acute heart disease, reduced resistance to illness, increased recuperation time, and general fatigue. However, humans are by nature lazy gamblers who are willing to take risks in the hope that they will be the exception to the rule. This may be the reason that calling attention to the dangers of smoking, alcohol, obesity, and the sedentary life style have seldom been effective in changing these risky behaviors. People devote more attention to maintaining the good condition of their cars or their pets than they do to the maintenance of their own bodies. It is becoming increasingly evident that we should be physically fit if we are to manage effectively our daily activities and make our leisure time meaningful. This can be accomplished by setting aside three or four, half-hour periods a week to devote to a rational exercise program. This amount seems to be sufficient to build up and maintain good physical fitness and cardiovascular health.

It is legendary that the American is unfit. In fact, a recent study determined that the average American was not only below the fitness norms set by the American Heart Association, but 40% of the men and 47% of the women had fitness levels that could be classified as either fair or poor. These data were collected using the aerobics tests of Dr. Cooper (either a mile and a half run or a twelve minute walk-run) and translated into cardiovascular standards. But what we are really talking about is a person's maximal aerobic capacity or Max  $\text{VO}_2$ . Most of our data on Army personnel are not identical to Cooper's because we collected it using direct determinations of aerobic capacity, not estimates. We can see that, using oxygen uptake, there is a consistent reduction of CV fitness with increasing age, and that this reduction may be aggravated by the failure of the individuals to maintain adequate levels of physical activity (Figure 1). However, it must be recognized that not only adults suffer from the effects of indolence; most American children are unfit as well. In fact, heart disease and most likely obesity must be considered pediatric problems. Many researchers in physical education have noted that for the ordinary child, physical education seems to be a decreasing function of age from the time that we put him behind a desk in the first years of school. In a series of longitudinal studies of school children, it was found that CV fitness declined steadily from the age of eight, stabilizing at a very low level only in late adolescence. Likewise, the first traces of AHD also occur in the blood vessels at about this time in many teenagers, as has been documented in the autopsy studies that were carried out during the Vietnam and Korean wars. However, these disease processes had not reached an advanced stage. They are reversible,

and they may be reversible even until one is quite ill. However, when AHD is well established, the condition is much more serious. In any case, the time for prevention is now.

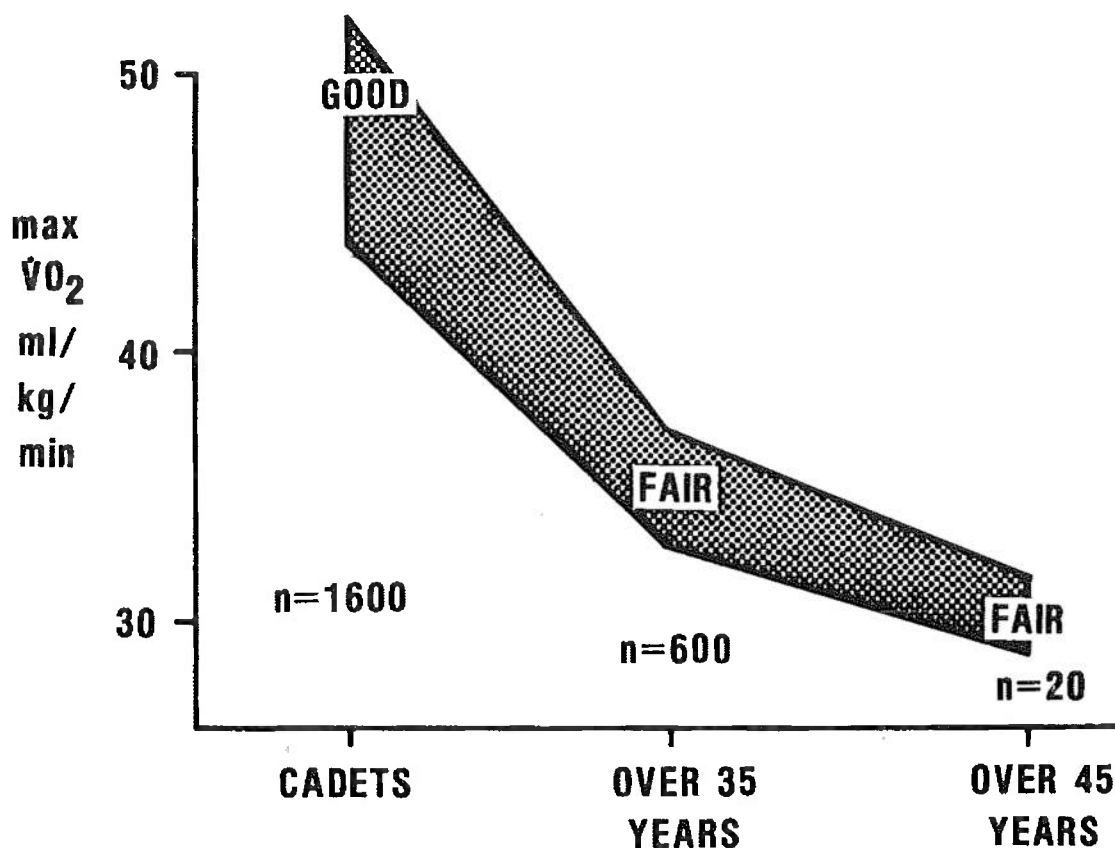


Figure 1. Comparison of different age groups on the basis of Max VO<sub>2</sub>.

It is not surprising that Americans are overweight, since inactivity and obesity often go together. A recently completed nutritional study revealed that over half of the adult population in the U.S. is overweight. What is more surprising is the fact that those who are fat eat about the same number of calories as those who have maintained a normal weight. Since our weight is a balance between energy expenditure and the calories that we eat, a large part of the problem of obesity must lie in our sedentary lifestyle or basal metabolic level. It is not difficult to understand why we are unfit and overweight. Food is readily available and usually designed, packaged and prepared to be extremely palatable, a pleasure to eat. If we eat 100 calories more than we need each day, we would gain 10 lbs. in a year. This weight gain could be prevented by a daily brisk one-mile walk. Unfortunately, in our society we need only a minimal amount of activity to get us through the average working day. Even if we wanted to exercise, the temptations of inactivity are very great. Our automobiles tempt us away from walking, using elevators rather than stairs, and most importantly, the television

tempts us away from other activities that might use up a little bit of this excess energy. But as P.D. White so aptly phrased the problem:

Prevention of disease has attracted much less attention than its diagnosis and treatment. It obviously deserves the first priority, but it is less dramatic than surgical procedures, is rarely asked for by the not-yet-educated public, and the doctors are overworked simply taking care of sick people.<sup>1</sup>

A study of leisure time activities recently conducted by the Harris Poll for the Perrier Foundation<sup>2</sup> reported that 60% of the adult population engages in some form of physical activity such as walking for pleasure, jogging, hiking or other exercise. However, the discouraging fact was that 40% of the population were completely inactive!

The way in which we eat, exercise, smoke, and take care of ourselves, has a significant influence on our risk of contracting many diseases. In a sense, many of the major health problems in this country, such as AHD, automobile injuries (Figure 2), cancer of the lungs, obesity, and suicide must be classified as "diseases of choice". Responsibility for these diseases must lie with the individual himself, not with the society — and that's where any proposed changes must have their impact. However, there have been some encouraging developments in the last 7 or 8 years. Once called a nation of spectators, Americans are becoming a nation of hikers, tennis players, swimmers and most dramatically a nation of joggers. The reality of this fitness boom is easier to describe than to understand. For one thing, the motives to play tennis and to jog do not necessarily coincide. However, there does seem to be some common denominator that runs through much of this new concern about our bodies. These can be summarized in terms of concern for cardiovascular health, physique, or body composition and psychological well being. These can be best understood by looking at the history of the exercise boom in the U.S. By the late 1960's, the incidence of heart disease had reached epidemic status in this country. Americans, particularly American men, were becoming ominously aware of coronary artery disease and with good reason. They could no longer ignore the fact that, when they looked around, they were seeing their contemporaries having heart attacks at 35 and 40. Thus when P.D. White reemphasized the importance of exercise — exercise for rehabilitating and perhaps preventing the ravages of heart disease — he found a receptive audience. Prevention of heart disease had an immediacy that other prevention efforts lacked. It is not a coincidence that the increase in vigorous activity in the past decade has been most marked in the middle age, middle class American — precisely those who were, and are, at the greatest risk for heart disease. It may be coincidental, but the rate of heart disease began to drop off sometime between 1972 and 1974 and has continued to drop since then. There seem to be some other reasons for this dramatic drop in the disease rate besides exercise: improved diet, public concern, and improved acute medical care; but exercise certainly has played a significant role in consciousness-raising.

However, there are some myths about exercise that need to be clarified. We would like to believe that there is a monotonic relationship between exercise and health. The more you exercise, the better it is for you, right? Everybody knows this, and also that the optimum form of exercise is jogging. Well, that is probably not the case. There seems to be a certain

amount of any regular exercise that is necessary and sufficient for health. Paffenbarger<sup>3</sup> has found that energy expenditure between 2,000 and 2,500 calories a week beyond basic levels seems to be protective against heart disease (Figure 3). But remember that this was based on a statistical evaluation and not a casual relationship. The point is that we do not need to go out and jog ten miles every day to maintain an adequate level of cardio-respiratory fitness, cardio-vascular health, or body composition.

## RANKING CAUSE OF DEATH BY AGE

### CHANCES PER 100,000 IN 10 YEARS

Rank	25years	35years	45years	55years
1	MVA, 450	HA, 620	HA, 2,650	HA, 6,500
2	SU, 230	MVA, 325	CA, 480	CA, 1,375
3	HA, 90	SU, 270	MVA, 320	ST, 850
Total causes	1,700	2,860	7,250	15,800
MVA: Motor Vehicle Accident. HA: Heart Attack. SU: Suicide. ST: Stroke. CA: Cancer.				

Figure 2. Ranking causes of death by age.

However, if we look at a cross section of young Americans in the military, we are discouraged. (Figure 3A) This slide presents some body composition data collected on 934 males and almost 500 females at Fort Jackson in January, 1978.<sup>4</sup> The percent body fat figures border on obesity in 28% of the women and 16% of the men. Percent body fat norms for the American male is 15% and 25% for the female respectively. Do you think they lose that body fat after basic training? I am afraid not. All of a sudden the women go off their diet and start eating dining hall food that is about 3,500 calories a day, and they just are not burning up that much. They can't understand why their uniforms don't fit by the end of the eight weeks. Here is a sample (Figure 4) of cadets at West Point — Infantry school personnel, primarily basic trainees and support troops. Fifteen percent of the population have too much fat. I'm talking about males who have 25% body fat or more.



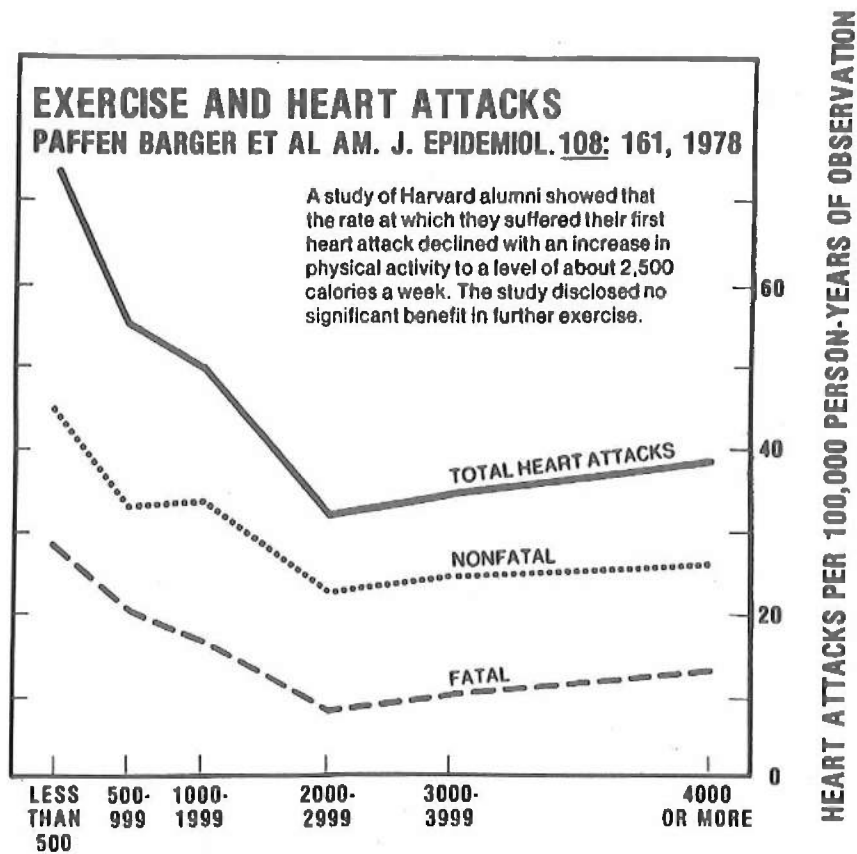


Figure 3. Exercise and heart attacks.

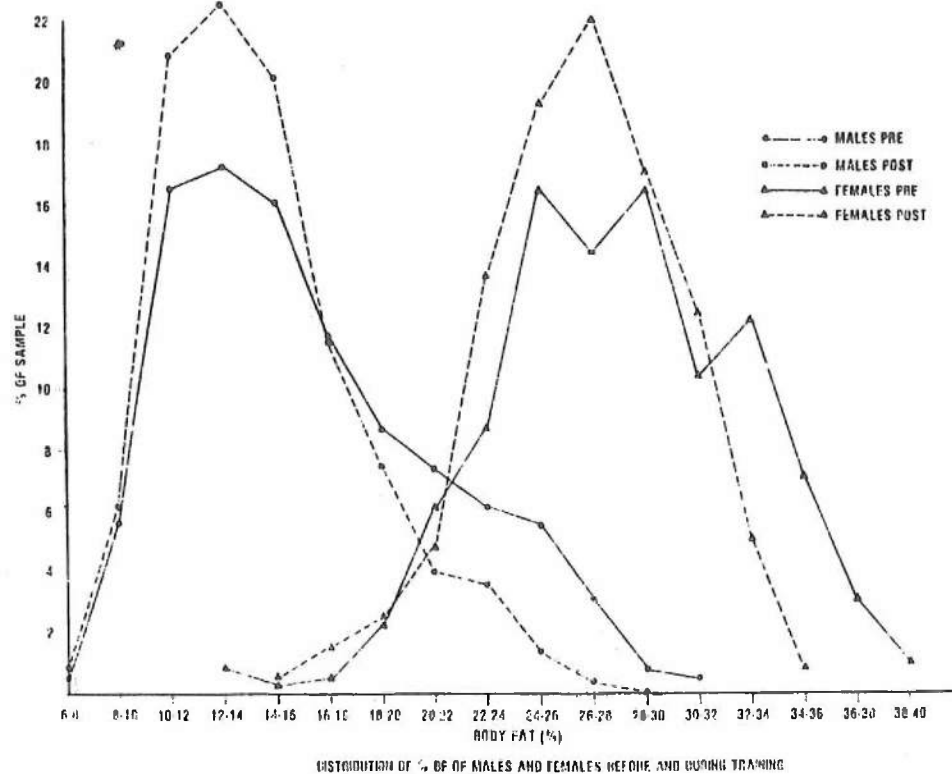


Figure 3A. Percent body fat percentages for a military population.

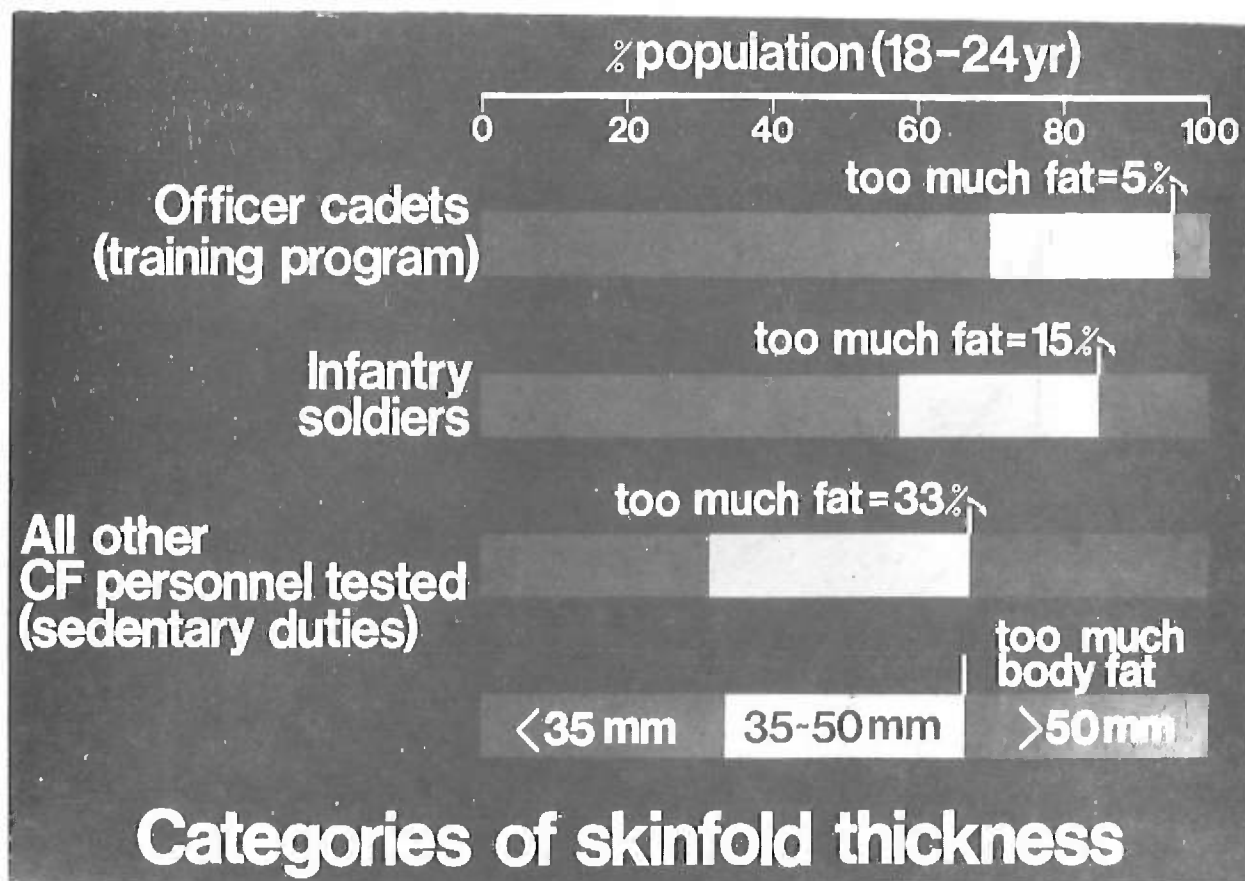


Figure 4. Categories of skinfold thickness for different military populations.

The words "diet" and "heart disease" are charged with emotion. The reasons for the emotional responses to these words are important to consider when changes in attitudes or habits related to either diet or exercise or heart disease are proposed. In the old days, they thought that you could change attitudes and behaviors would follow suit. I think, now, we realize that changing attitudes about what is healthy does very little. We may have to resort to altering behavior first, in order to change attitudes. Attitudes may follow behavior, as opposed to the other way around. However, not all observers agree that changes in diet will forestall the ravages of heart disease. Even among those who believe in this, there are differences of opinion as to how much and what kind of dietary change should be recommended. The diet/heart situation is compounded and confounded by the heterogeneity of the population and the multiplicity of causes of heart disease. Hypercholesterolemia is not atherosclerosis, nor is it obesity, nor are any of the known risk factors synonymous with heart disease, but these risk factors do influence heart disease just as surely as diet and energy expenditure influence body composition. Furthermore, whatever the mechanisms may be, there is no longer any doubt that obesity potentiates the risk of hypertension and that obesity is associated with hyperlipidemia, hyperglycemia, and hyperuricemia, and markedly increases the risk of atherosclerotic heart disease.

Obesity is a fairly accurate indicator of blood pressure. Recent studies have shown the important role of obesity in the elevation of serum lipid concentrations, or perhaps it would be better to state the reverse. Reduction of excess body weight reduces serum lipid levels. This is not to say that reducing serum lipid levels or keeping them normal will guarantee you freedom from heart disease, but keeping body weight, blood pressure, and serum cholesterol levels within normal limits certainly improves your chances, particularly in those who are at high risk because of their family history. Prudent dietary measures are often recommended for these people with predisposing factors. However, most evidence to date suggests that dietary changes confer little, if any, benefit on the individual after atherosclerosis manifests itself as coronary artery disease.

Those physicians who would prevent atherosclerosis in their patients, especially those at high risk, are directing attention to preventing it through dietary changes during young adulthood and childhood. This has brought the prevention of heart disease into the pediatric realm. Much of what the pediatrician routinely does is directed toward preventing disease. In a large measure, these efforts are aimed at preventing infectious disease. But we should now be directing our attention towards chronic diseases as well, particularly in the area of dietary disorders. Diet to prevent anemia or rickets, diet to control inborn errors in metabolism, and now diet to curb obesity and probably atherosclerosis heart disease. With heart disease there is, in addition to the caloric issues and type of fat intake, the question of salt intake. At present, the available data strongly support a limitation of salt intake in persons with hypertension. Whether salt itself is the cause of hypertension is not yet settled. Therefore, depending on the physician and the patient's preference, salt intake should be restricted for the hypertension or AHD. While questions still surround the role of diet as a causative factor in heart disease, some of the original questions have been answered. Obesity does increase the risk of hypertension and hyperlipidemia in an individual, and this also increases the risk of heart disease, as well as cerebral vascular and renal disease. Accordingly, leanness should be encouraged. The question is how to go about it — cut down your caloric intake or increase your exercise level or both of these?

We looked at an Army population and tried to assess their risk factors based on the fitness categories presented earlier in the presentation and found some highly suggestive data (Figures 5–9). The fitter the person, the lower percent body fat he possessed. Blood pressure and cholesterol and triglyceride levels also showed a marked decrease. However, when we looked at the amount of smoking there was no relationship at all, suggesting that smoking is a well entrenched habit in our society and cannot be related to the incidence of disease. However, an encouraging note is that once a person begins to be concerned about his cardiovascular health, he also becomes concerned about his diet, his smoking habits, and his activity levels as well.

When we talk about the effects of exercise, we often refer to certain theoretical modifications in the physical and metabolic processes. Figure 10 outlines some of the more relevant changes. All of these changes seem to be involved in the reduction of risk factors for cardiovascular disease and increased performance capacity (See Table 1 and Figures 11–14).

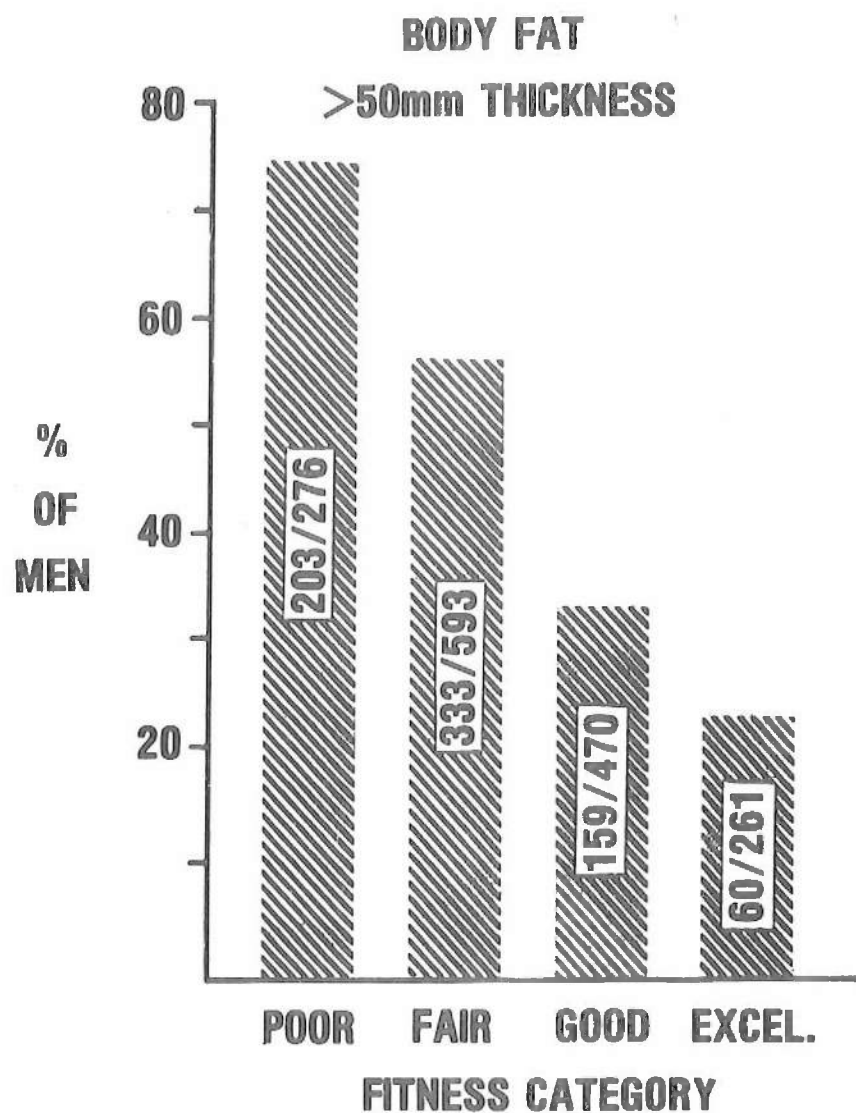


Figure 5. Percent body fat for different categories of physical fitness. Ratios in bars represent the sample size and prevalence of fitness level.

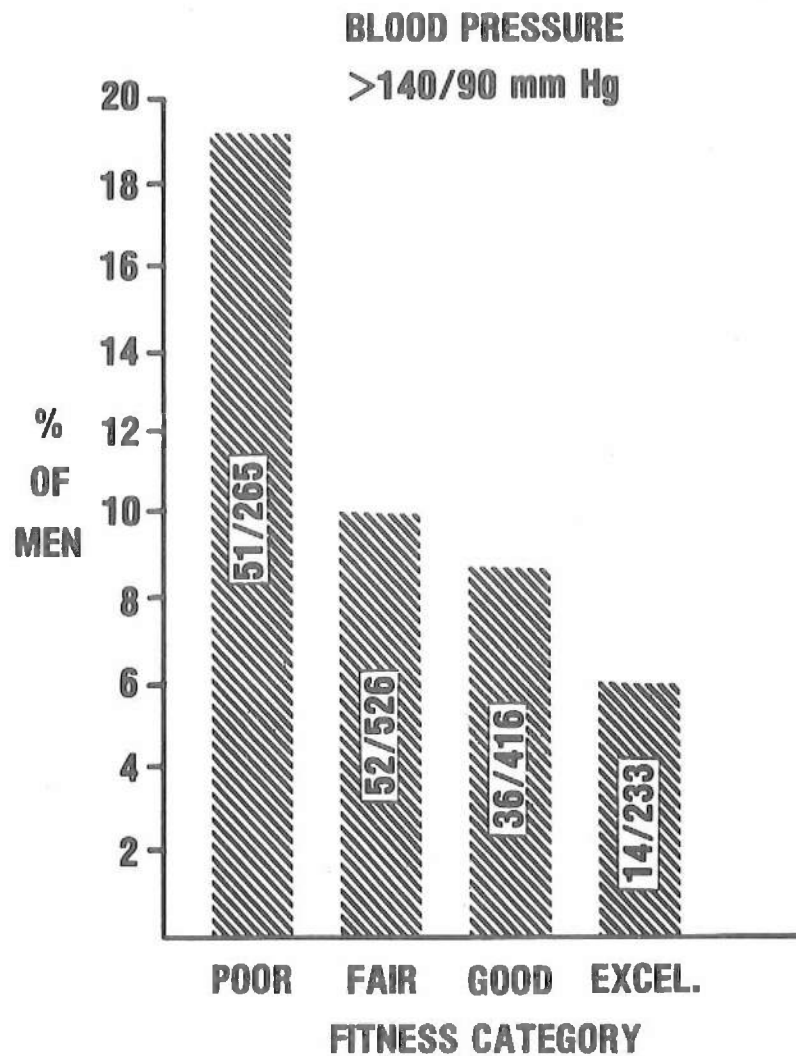


Figure 6. Blood pressure for different categories of physical fitness. Ratios in bars represent the sample size and prevalence of fitness level.

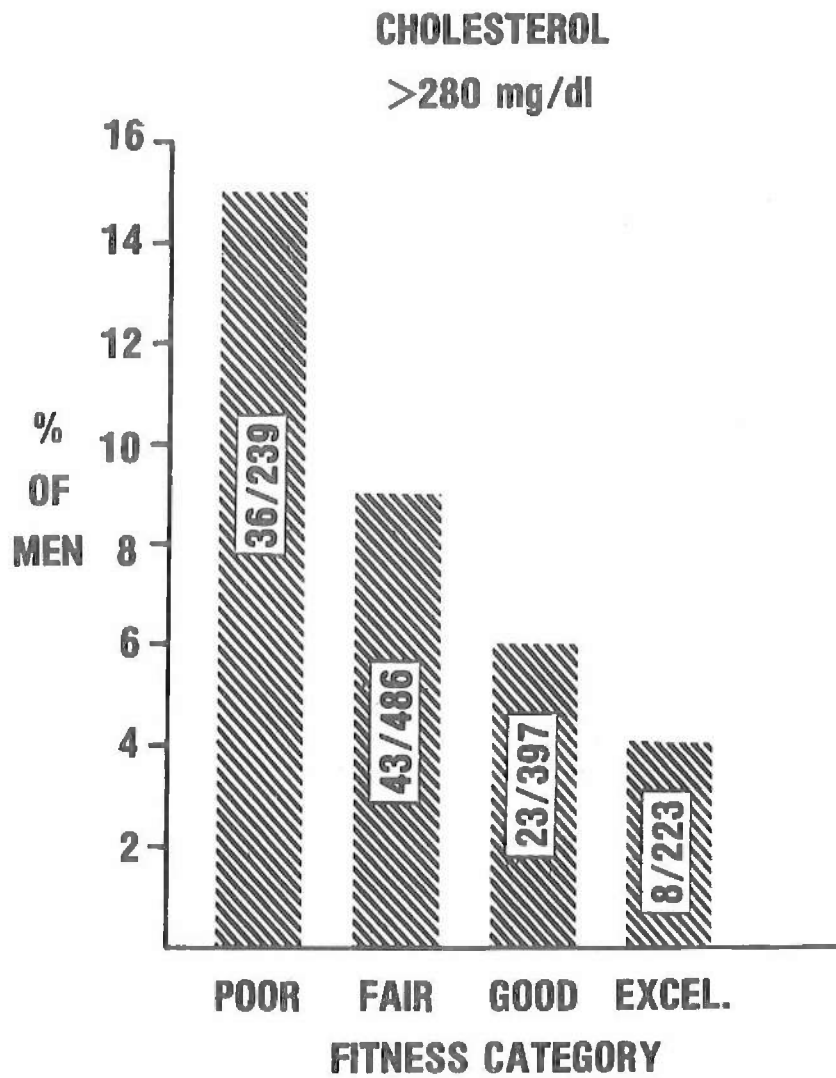


Figure 7. Cholesterol levels for different categories of physical fitness. Ratios in bars represent the sample size and prevalence of fitness level.

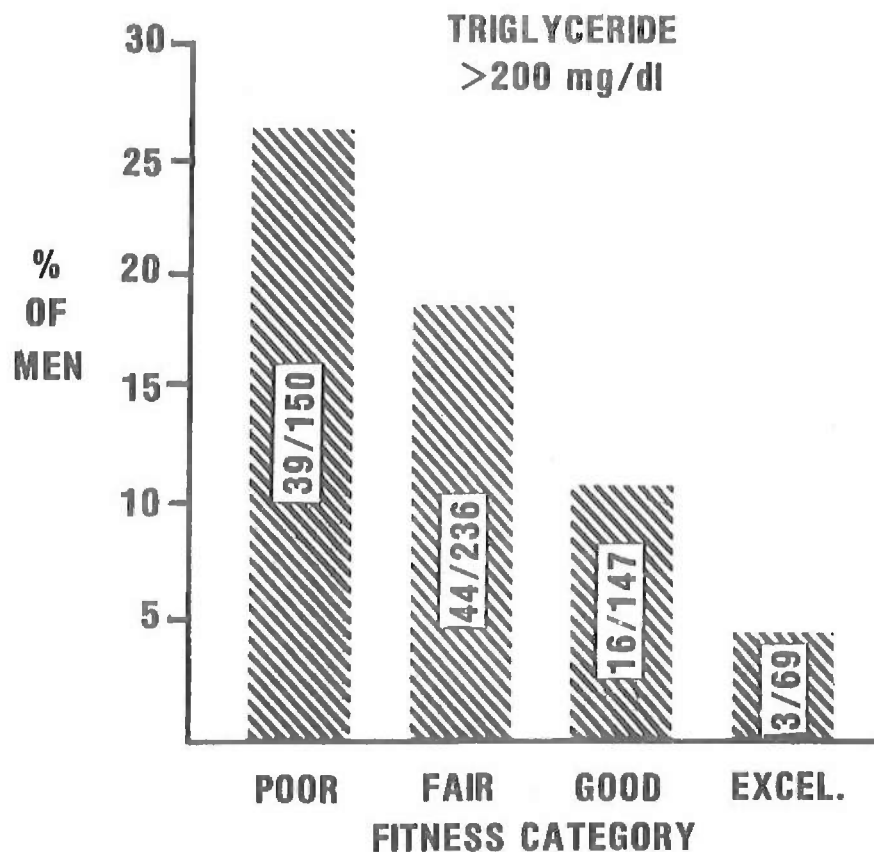


Figure 8. Triglyceride levels for different categories of physical fitness. Ratios in bars represent the sample size and prevalence of fitness level.

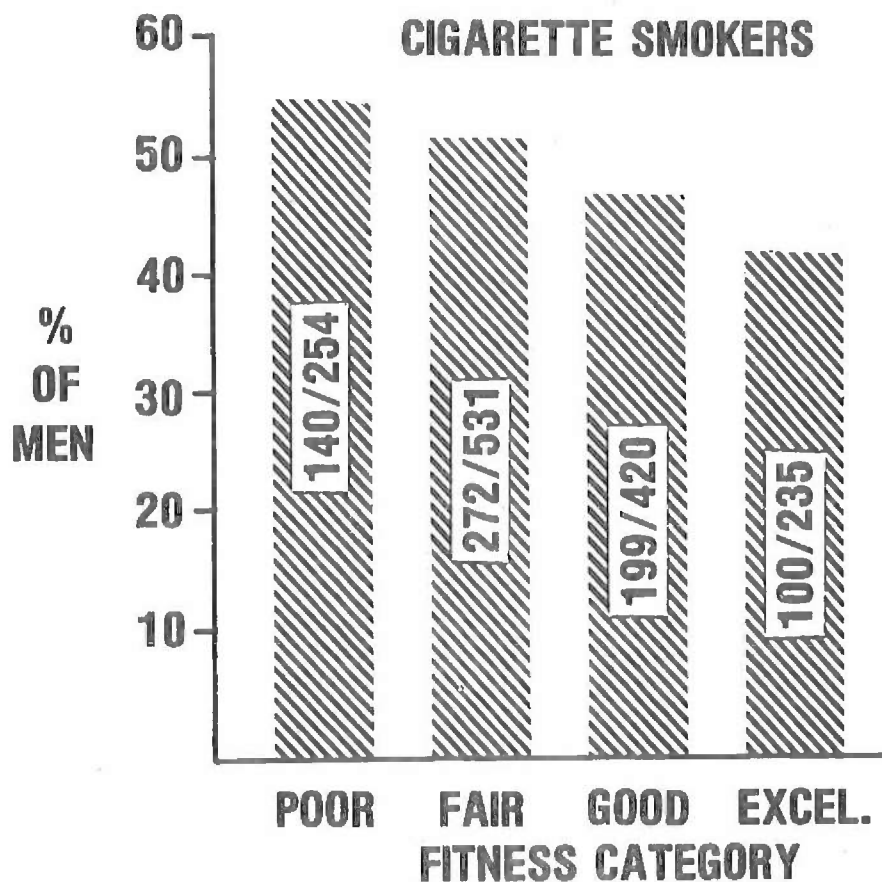


Figure 9. Cigarette smoking for different categories of physical fitness. Ratios in bars represent the sample size and prevalence of fitness level.

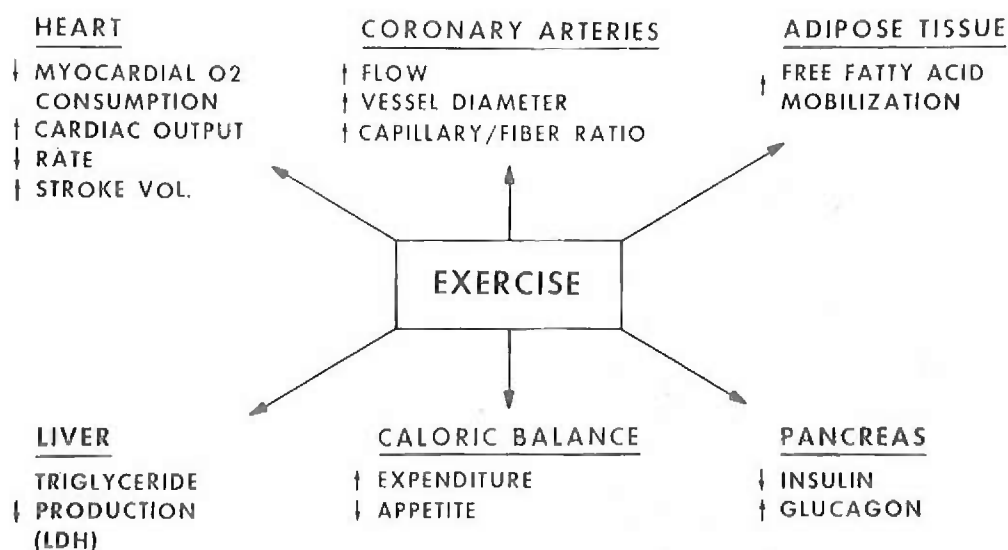


Figure 10. Cardiovascular and metabolic adaptation that theoretically occur with exercise.

**TABLE I**  
**ANTHROPOMETRIC MEASUREMENTS (M ± SD)**  
**BY AGE GROUP**

	35-39	40-44	45-49	50-54
N	16	16	16	5
HEIGHT (cm)	177.1 ± 6.6	178.9 ± 3.9	177.6 ± 4.7	177.8 ± 6.6
WEIGHT (Kg)	79.9 ± 8.5	81.6 ± 6.9	78.5 ± 9.2	75.2 ± 5.5
BODY FAT (%)	18.6 ± 4.2	19.5 ± 3.3	18.5 ± 3.5	17.4 ± 3.3

Table 1. Anthropometric Measurements (M±SD) By Age Group



# MEAN BLOOD CHEMISTRY VALUES FOR CHOLESTEROLS, TRIGLYCERIDES AND GLUCOSE (mg/%)

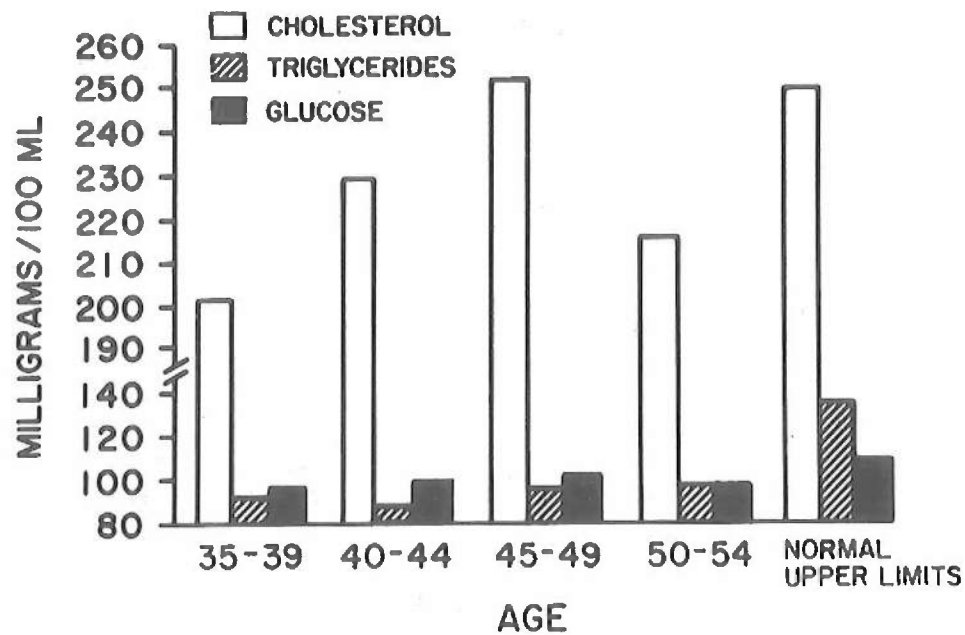


Figure 11. Mean blood chemistry values for triglycerides, cholesterol and glucose in different aged military personnel.

# MEAN RESTING BLOOD PRESSURE (mmHg) AND HEART RATE (BPM)

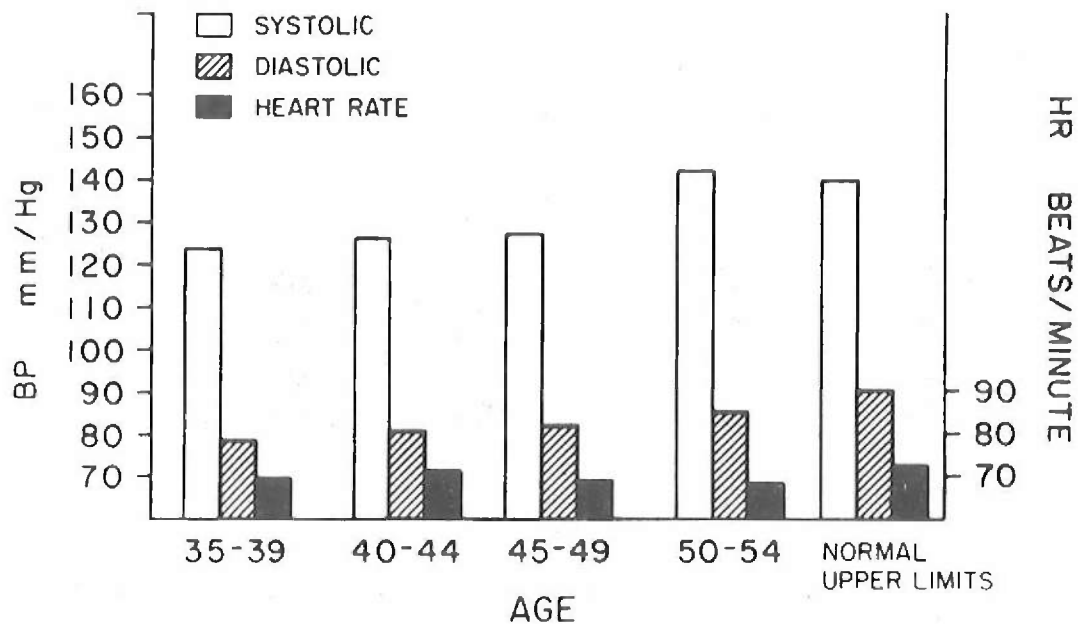


Figure 12. Mean resting blood pressures and heart rates for different aged military personnel.

### PERCENT OF INDIVIDUALS WHO SMOKED IN EACH AGE CATEGORY

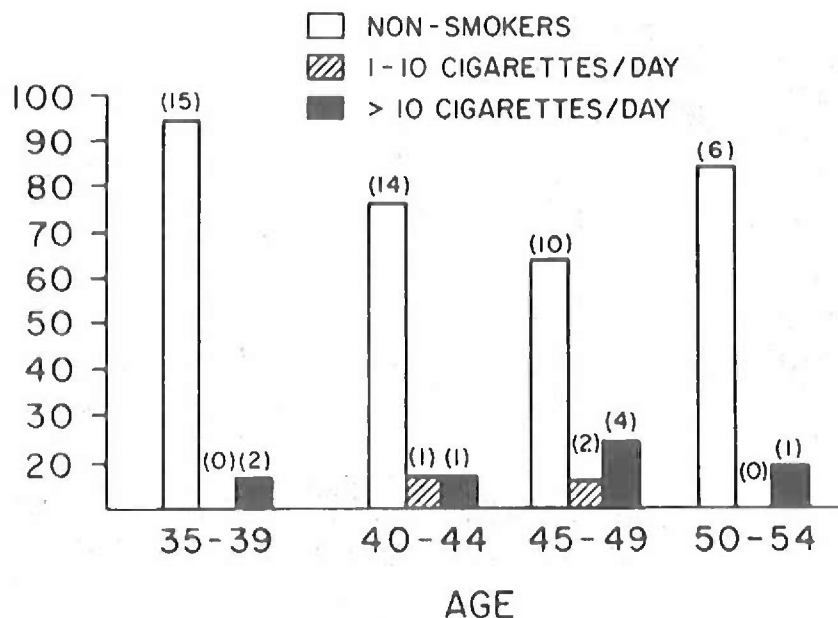


Figure 13. Percent of military who smoked in each age category.

### MAXIMAL AEROBIC CAPACITY ( $VO_2$ MAX) AND EXERCISE HEART RATE

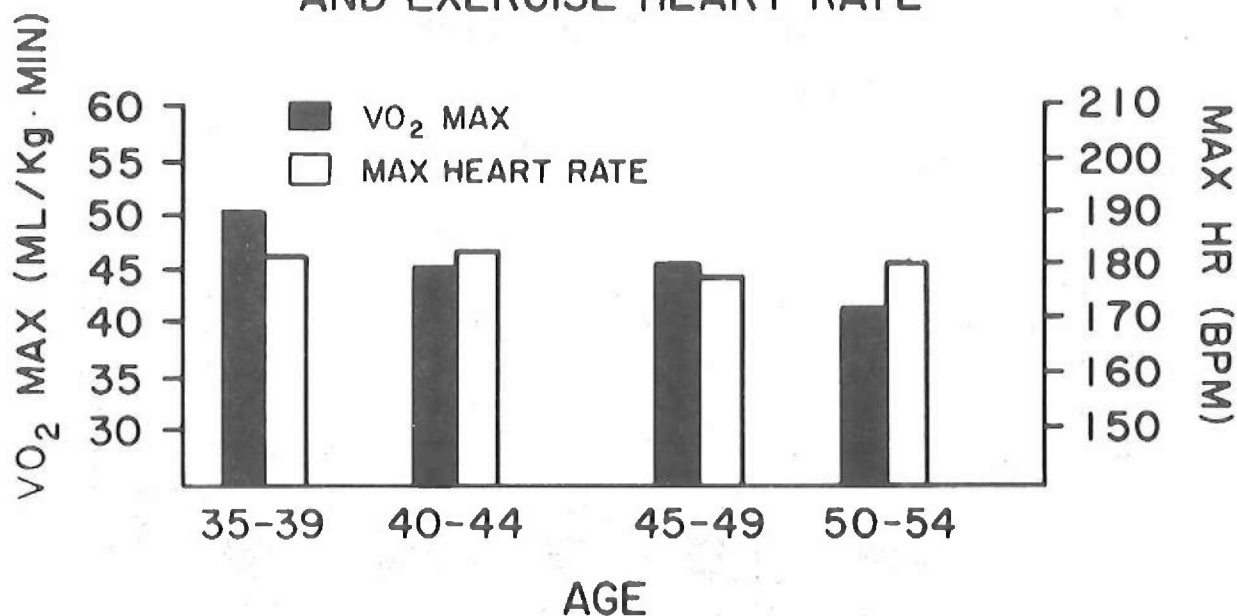


Figure 14. Maximal aerobic capacity and exercise heart rate for different aged military personnel.

Here are presented some crosssectional age data from a study we did at West Point on older military personnel (between 35–55 years of age) using the complete spectrum of assessment techniques available.<sup>5</sup> Of those who participated and were completely asymptomatic, we found three who manifested evident atherosclerotic heart disease in terms of their EKG's ST segment depression during the exercise tolerance testing and/or abnormal blood pressure responses to exercise. Yet all claimed to be in perfect health and were without symptoms usually associated with heart disease. Here is one of the prime difficulties encountered with the problem of adherence or compliance of a patient to a regimen. It is difficult to convince a person that he is sick when he doesn't manifest symptoms that verify the disease's presence. You really are not going to do anything about health if you are healthy. Take a person who is hypertensive and get him to comply with a regimen of anti-hypertensive medication. The medication has some unpleasant side effects and adherence is virtually zero. This same problem plagues the nutrition and exercise regimens that are often prescribed to patients. The nutritionist spends most of his time sitting by the bedside of a patient telling the patient what he should have done for the last five or ten years regarding his diet. Likewise, exercise prescriptions are often ignored for a variety of very cogent reasons, until the disease has progressed to advanced stages.

What then are the levels of fitness that would be necessary to fill the needs of the Army for adequate work capacity and provide protection from the ravages of heart disease for all military personnel? Tables 2 and 3 represent what I consider to be the recommended fitness levels for different aged military personnel. However, I feel obliged to introduce this caveat, since part of the military's function is to be ready in case of national emergency; it is important that they have at least an aerobic capacity of 45 ml/kg per min. when they enter the service and maintain this level during service regardless of age or duty assignment.<sup>6</sup> Likewise, here is a proposal that may provide military personnel who dine in the mess halls some rational advice regarding caloric intake and exercise equivalents (Figure 15). This kind of information program could be augmented with a periodic assessment of body composition and weight evaluation. It will help to emphasize that, if caloric intake is in excess of energy requirements by as little as 100 calories over the period of a year, this will bring about an increase in weight of 10 lb.

Recently, there have been a number of clinical programs that have developed life style appraisals and have found that if you assess any given individual on the basis of his age, exercise pattern, smoking habits, drinking habits, obesity, and number of miles driven during a year, an appraised age can be calculated.<sup>7</sup> These may be useful instruments to institute as part of the periodic physical screening (Figure 16) to assist and aid the military personnel in making a rational health decision. Fear is not enough, because you cannot expect to scare people about diseases that they do not have, but you can advise them of the consequences of specific disease-related behaviors. However, since these behavior patterns were not developed in a day or a month, systematic modification programs must be available and encouraged if we expect people to act in a manner to counteract the disease-process. See, for example, J.W. Farquhar's excellent book.<sup>8</sup>

PHYSICAL FITNESS TESTS AND STANDARDS MALE PERSONNEL - AEROBIC TEST				
DISTANCE 1.5 MILES IN MINUTES AND SECONDS BY AGE				
FITNESS CATEGORY	A UNDER 30	B 30-39	C 40-49	D OVER 50
Poor	>16.30	>17.30	>18.30	>19.00
Fair	14.31-16.30	15.31-17.30	16.31-18.30	17.01-19.00
Average	12.01-14.30	13.01-15.30	14.01-16.30	14.31-17.00
Good	10.16-12.00	11.01-13.00	11.31-14.00	12.01-14.30
Excellent	<10.16	<11.01	<11.31	<12.01

Table 2. Physical fitness categories and standards for male personnel.

PHYSICAL FITNESS TESTS AND STANDARDS FEMALE PERSONNEL - AEROBIC TEST				
DISTANCE (MILES) WALKED AND RUN IN 12 MINUTES BY AGE				
FITNESS CATEGORY	A UNDER 30	B 30-39	C 40-49	D 50-59
Poor	>.95	>.85	>.75	>.65
Fair	.95-1.14	.85-1.04	.75-.94	.65-.84
Average	1.15-1.34	1.05-1.24	.95-1.14	.85-1.04
Good	1.35-1.64	1.25-1.54	1.15-1.44	1.05-1.34
Excellent	>1.65	>1.55	>1.45	>1.35

Table 3. Physical fitness categories and standards for female personnel.

Food equal  
to 100 calories

1 coffee  
one egg

1 apple

1 banana

2 slices  
of bread

1 slice of  
cheese

## WEIGHT CONTROL

Did you know?

Daily adult requirement of calories  
for maintenance  
for sedentary activity  
total

Daily adult consumption of calories  
from foodstuffs  
net excess

100 Excess calories per day is equal  
to 10 lbs of accumulated fat in one year

To maintain your present weight you could

reduce calorie intake by  
100 calories each day  
or  
increase activity equivalent to  
100 calories each day

Exercise equal  
to 100 calories

30 min. walking

9 min. cycling

14 min. tennis

20 min. golf

8 min. swimming

20 min. bowling

Figure 15. Weight control program display.

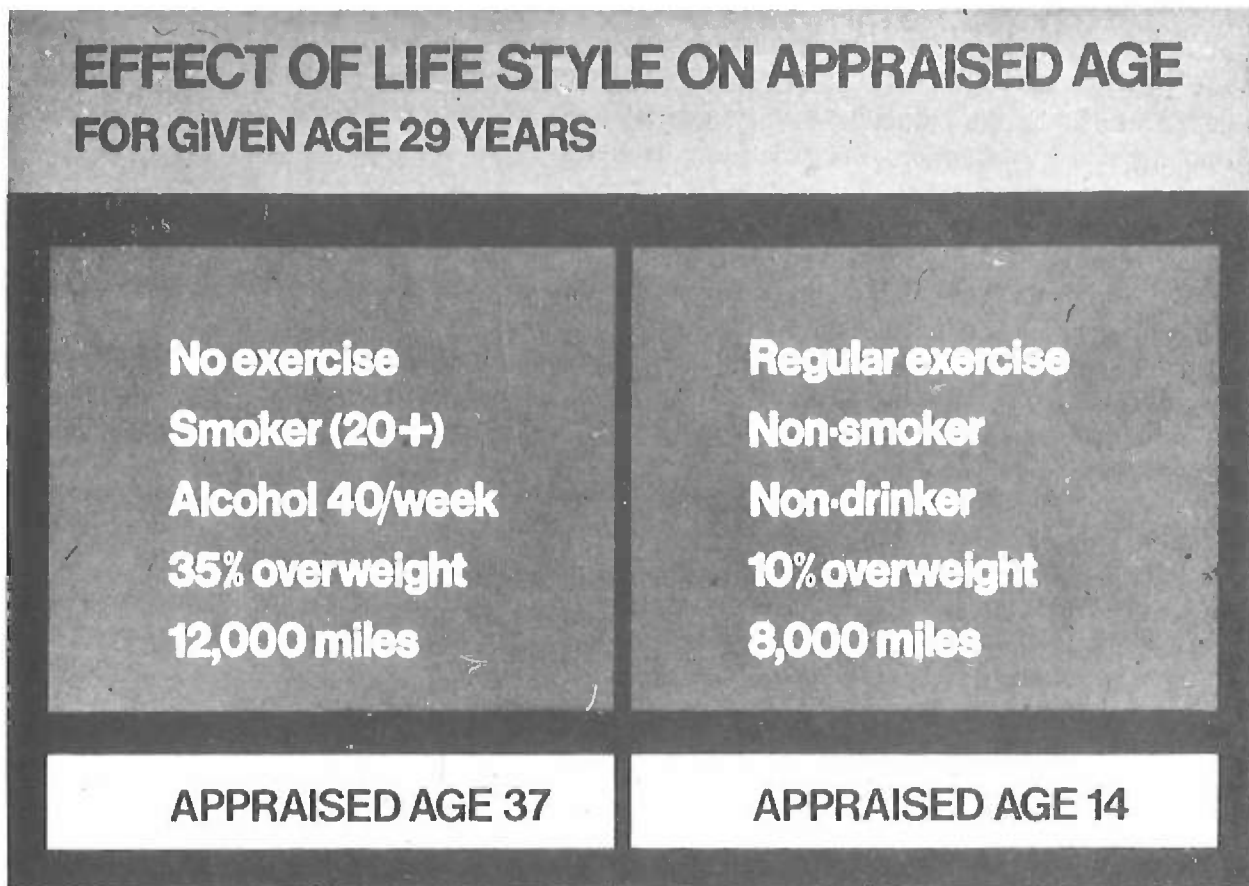


Figure 16. Effect of life style on appraised age.

The whole area of personal health behavior has been the target of a broad spectrum of conceptual formulations, for example, Becker's Health Belief Model.<sup>9</sup> However, none of the current models sufficiently deals with the many aspects of adherence behavior for several reasons: (1) The person at risk, where he/she feels well but knows that one or more risk factors are present, does not fit the definition of either health behavior, any activity undertaken by a person believing himself to be healthy for the purposes of preventing disease or detecting it in an asymptomatic stage, or illness behavior, any activity, undertaken by a person who feels ill, but fails somewhere in between and (2) complying with a regimen of diet or exercise in order to bring about a reduction in risk requires sick-role behavior from a person who does not feel sick, and the treatment regimen has minimal social and institutional support. These inadequacies suggest the need for the introduction of an at risk role following Baric's conceptualization.<sup>10</sup> Baric points out that, in contrast to the sick role, the at risk role (1) is not institutionalized, (2) has only duties attached to it, but no privileges, (3) is indefinite in duration, (4) lacks continuous reinforcement from health professionals and the social organization, and (5) lacks the feedback provided by changes in symptomology. However, one difference exists in individuals who adhere to a diet or exercise regimen to control their at risk status for obesity or AHD these days — they do experience feedback in the form of improved stamina and social recognition for their reduction of risk factors. This, therefore, constitutes an advantage over other preventative programs that have attempted to modify health related behavior.

The death rate in the U.S. for diseases of the heart and circulatory system has decreased over the last 10 years, but no one has been able to establish how much of this decline could be attributed to the reduction in incidence of AHD and its risk factors, such as cholesterol, smoking and hypertension, and how much is due to better acute patient care. Probably both have played a part, but definitive data are not readily available. However, this may be simply a part of the broader trend of a decrease in the overall mortality rate in the U.S. In fact, among the major causes of death mentioned in this paper, only cancer, suicide, and pulmonary disease have increased in their incidence during the last decade. But why? Is it the better control of hypertension, through less salt and increased screening, or the reduction of the serum lipoproteins, through diet, or the decreased prevalence of smoking or the increased emphasis on exercise? The contribution of these factors to the decreased mortality rate still remains uncertain.

Many of us believe that at least one of these factors, namely exercise, is effective in preventing heart disease. But the fact remains that the lack of exercise has not been shown to be a risk factor for heart disease, let alone a cause. Likewise, it may be impossible to prove that exercise prevents or ameliorates the effect of heart disease. The problem is one of self selection. Healthy people tend to exercise, less healthy people tend not to, partly because they are unable. Therefore, the incidence of heart disease among exercisers will be lower than among non-exercisers. This is the major stumbling block in proving that exercise is instrumental in the prevention of heart disease. This failure does not mean that exercise is not beneficial. Exercise promotes weight control and contributes to a general sense of well-being in most people.

What then does a reasonable person do to optimize his chances of either preventing heart disease or minimizing its devastating effects? Among the measures suggested to prevent heart disease, neither cholesterol-lowering diets, relaxation, nor exercise has proved beneficial. In the end, each person must make his own decision based on a belief system that suits himself, not on any scientifically verified proof.

Many will agree though, that it may be worth changing one or several of our life style regimens if there is even a faint possibility that it may be effective in preventing heart disease, even if hard evidence is not available. No one wants the distinction of being the smartest human being in the cemetery!

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## PLANNING FOR NUTRITION AND PHYSICAL FITNESS PROGRAMS

Robert Buxbaum

I want to try to approach the question of how nutritional policy infringes upon fitness policy, and vice versa. I enter this area not as a nutritionist, nor as an exercise physiologist, but as one interested in public policy and as a practicing physician.

A policy can be the result of deliberate planning or it can evolve in a vacuum, more or less as a product of neglect. A country as large and varied as ours is a difficult place in which to develop strict guidelines for any health-related public policy. And yet my sense is that in the fields of nutrition and physical fitness, a large sentiment for combining forces and working together is growing and some of the chaos which now characterizes this aspect of health promotion may yield soon to a more rational planning process. This is important to bring about since the product, in my view, is likely to be the enhancement of the health of our citizens.

One thing which is probably true of our post-industrial society is that little real muscular work gets done. The average desk worker, housewife (if indeed there are any left), factory worker, or salesperson expends little more energy in a day's work than that required to lie down and breathe. Since energy expenditures can be quantified in the same or similar fashion as energy intake, it seems reasonable to learn as much about the energy and muscular requirements of daily work as we can. Unfortunately, most Americans are not well acquainted with this field — ergonomics — and its application to our daily life has been minimal. Nonetheless, since the nature of work has changed quite radically over the past century from manual labor to machine-assisted activities, it is important for us to know what the costs as well as benefits of that shift have been. Further, it might be conjectured that a major change had taken place in the nature of play and recreation from participation to spectatorism. If this is true, and exercise is important to one's health, then it is clearly time for us to find ways to exercise. It is also important to find ways to integrate nutrition policy with fitness policy, something which has been successfully accomplished, for instance, in Sweden, where by now the public accepts the notion that the two are inseparable.<sup>1</sup>

Fitness policy can be developed in a number of presently underdeveloped areas. Many physical activities have health benefits, particularly if carried out in a regular fashion and for enough minutes each time. Walking is clearly one of the most cost-effective methods available to us,<sup>2</sup> and swimming, running, jumping rope, dancing, and cross-country skiing are likewise of immense benefit to the human organism.<sup>3,4</sup> Furthermore, the numbers of excess calories burned are not insignificant. The development of fitness programs is clearly a policy issue, and becomes more important as we begin to realize that it is more costly **not** to develop these approaches than to do so.<sup>5</sup> Health promotion (or what used to be called preventive medicine) now includes aerobic and other forms of exercise which used to be considered appropriate to a small group of athletes or a cadre of true believers at the fringes of society. Now, with almost everyone at least **thinking** that exercise is good, the problem has become one of advising and teaching people how to do it without injuring themselves. As this movement progresses, we hope that the federal agencies will begin to find better ways of promoting exercise and to recognize the value of funding research and development in this vital area, which is



just as important as the work being done to try to maintain people with end-stage syndromes, which are at least in part the consequence of risk factors which might have been better controlled.

Also, since until recently we accepted the notion that the automobile is the most important means of transport available to us, we may have tended to overlook its costs to us in terms of lack of health or outright disease. Its effect upon the degenerative processes may be huge.

For any organization, including the Armed Services, it seems to me that a useful reason for promoting fitness is to attempt to reduce health care costs. It is my impression that that is why many other countries have developed programs to do this. When you know where all the money is going, and the cost-benefit ratio is poor, and when there are political decisions to be made, as in these countries with national health schemes, you may have to decide that promoting health looks mighty attractive as an alternative to coronary by-pass.

We don't know how effective fitness intervention programs really are, but that's in part because we have never been able to launch a good clinical trial of such programs. Further, we do not know whether fitness itself, in contradiction to those familiar categorical programs which are aimed at smoking, obesity, and alcoholism, represents a new and more holistic approach to health than these somewhat negative methods.<sup>6</sup> We have spent a lot of time and money telling people what not to do, very little advising them on something which is both enjoyable and health-promoting; the potential for this should be investigated. Some studies of this question have suggested that this approach really yields dividends in lifestyle modification, though there are other studies which are not so encouraging.

Perhaps the most powerful argument for exercise is a teleologic one. Professor Per-Olof Åstrand of the Karolinska Institute has pointed out repeatedly that the body is made for motion; yet we no longer forage for food, or hunt, or raise our own crops. Our muscles, on the other hand, were made for such activity, and if not maintained, will degenerate. So, too, will the physiologic performance of the cardiovascular system.<sup>7</sup> While it may not need to be in top shape if all you do is sit at a desk or behind the steering wheel all day, the deficiency will be immediately obvious should the need for fight or flight develop. So it seems reasonable to be prepared even if the chance of such a need is slight.

There are a number of questions I would ask about possible fitness programs to be developed under some kind of new policy. First, does the activity to be promoted actually benefit the health of its users? A national pastime in which half of the participants remain seated for almost half the game does not seem worthy of inclusion in a list of health-promoting activities; a recreation it is indeed, but not a fitness activity.

Second, we should inquire whether the activity in question is open and available to all people, regardless of sex, age, or (to the extent possible) physical handicap. If it's a program for kids only, why? Or, to put it another way, why aren't the sports we teach, sports for life? The physical activity taught to school children should be carried on by those same individuals when they are retirees.

Finally, the third question to be asked is: "Is it fun?" That's necessary, since a large number of programs, particularly those which have been designed for industries are rather grim,

making the dropout rate high and limiting the program to those participants who would exercise anyway, whether or not the facilities were offered.

Because the weight of evidence supports regular participation as necessary for fitness maintenance and cardiovascular health, a minimum of **three days a week** of exercise, about **thirty minutes in duration**, should be our national goal, whether in industries, in schools, in the Armed Services, or old people's homes, and these activities should be designed to raise the individual's pulse to something like 70% of his or her age-related maximum pulse rate, in order to retain or develop aerobic conditioning. In addition, flexibility and strengthening exercises can be added to this basic program for the obvious benefits which they offer. To encourage the development of such participation, a skillful promotional campaign needs to be developed, using the broadest range of motivational techniques. In addition, education concerning one's body and its exercise physiology should be tied in with this participation. As an individual's body changes and improves, he or she can learn a lot about what is actually going on in the cardiovascular and musculoskeletal areas.

From a fitness planning and development point of view, the United States is really an underdeveloped nation. Seen in this light, there are any number of remarkable opportunities for development. For instance, the field of recreation, including the entire parks and recreation management profession, lends itself to a potential reworking so that it becomes **health-oriented**, rather than **recreation-oriented exclusively**. In some countries, local recreation departments are actually given the responsibility of maintaining the health of well people. Lately, the message seems to have gotten through to recreation professionals, and one sees real interest on their part in planning for lifetime sports and other health-promoting fitness activities. The exercise trail (LifeCourse, Parcours Vita) is an example of the kind of simple, inexpensive, highly visible and attractive development which speaks to this goal.

A second area of potential development is in the training of school children, not only in enhancing their chances for lifetime fitness participation, but in teaching **physiology and nutrition** as related to exercise. Surely this is as much a responsibility of the classroom teacher as it is that of the gym instructor, and a lot of energy could be put into retraining the classroom teacher in the fundamentals of exercise physiology and nutrition; one example, the Learning for Life Program of the Newton, Massachusetts schools has developed a set of curriculum materials and techniques which address this issue.

A third area for future development is in our industries and work places. It is physiologically absurd to spend the day seated, and conversely, the workplace is the site of most potential for correcting that problem. In Scandinavia, Japan, and other countries, great emphasis has been placed upon exercise as part of the work day. Attractive and convenient programs, with excellent leadership draw millions of people around the world into such **work-related exercise programs**. Only in the United States is there a reluctance on the part of employers to sponsor such activities. The physiologic facts are in, and the few but important studies of reductions in sick-loss time in populations who exercise would seem sufficient to get the movement going, but there remains a small core of industrial fitness programs in our country which approach in quality those elsewhere.

One aspect of fitness policy development is that it is conceptually simple, so simple perhaps that its importance has eluded us as we have sought solutions to our inflationary and unproductive health care system. Because health care professionals are not generally acquainted with fitness and nutrition developments, and because the physical fitness profession and recreation planners have not thought of themselves as health promotion resources, there has been little movement to change the fitness behavior of Americans until recently. Now, as chaos begins to assert itself in this area, it becomes even more important to use principles of planning which rest upon some solid epidemiologic and physiologic foundations. I sincerely hope that is one of the results of this conference's efforts.

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## WHAT IS NUTRITION EDUCATION?

Joan Dye Gussow

Good afternoon! My assigned task for today is to answer the question, "What is Nutrition Education?" In addressing this question I have been asked to consider one or more of the following issues: (1) What should be the goals of a nutrition education program for the Air Force? (2) What educational programs are likely to attain these goals? (3) How can these programs be effectively organized and integrated? and (4) How can we assess whether these goals or objectives are being met? I have been given 20 minutes with which to attack this small subject.

In fact, when I initially began to think about the overall task, it seemed to me that it might actually be a good deal easier to design a successful program of nutrition education for the Armed Forces than to design such a program for the ordinary civilian out there on the street. After all, you had what I looked upon as a captive population.

A number of years ago I had occasion to work briefly with a psychologist who was using reinforcement theory to design educational programs for poor achievers. He used what is now familiarly known as a token economy — in which tokens are used as the equivalent of money, exchangeable for privileges — to reward participants for completing assigned learning tasks. He was reporting phenomenal success in rapidly transforming the young people he was working with into high achievers. His students, as it happened, were not only chronic school failures, but teenage muggers, rapists, murderers, and stickup men — prisoners in a federal juvenile prison. He had chosen to work in prison, he told a group of us, because he found the environment freer than he found the environment in the nation's schools.

When I sat down to prepare my remarks for this afternoon, I assumed that working in the Air Force to do nutrition education might offer some of the same advantages working in a prison offered my friend the psychologist — a captive population, the possibility of coercion, and a food system that didn't have to show a profit.

Fortunately, I learned in time that I was dead wrong. Dr. Maller was kind enough to send me the proceedings of a workshop on the Armed Forces and the Dietary Goals held in the fall of 1977 at Natick, Mass.; and I soon learned from reading them that if the Armed Services wish to feed people, they have to expend more effort than the local McDonald's attracting the trade. Or, as one of the participants in that program put it, "As in most of the food industry, we must define success by developing and marketing what is acceptable" — since otherwise the already astonishingly low (astonishing to a civilian at any rate) attendance at your dining halls will decrease even further.

You do have a few advantages. You can throw people out of the service if they don't lose weight (~~separate~~ them is your nice word for it — just as in New York City we don't fire people we excess them); and from a research standpoint, as Dr. Jacobs pointed out at the Natick conference, you have the equivalent of large cities of people on whom you can keep pretty close tabs. Furthermore, you can make use of the most experienced acceptability testing facility in the U.S., the one at Natick Laboratories. But you have, as it turns out,

typical Americans as clients, exercising their typical American prerogative of eating whatever has been made attractive to them by society and the media. So your nutrition education problem probably does not differ markedly from ours, that is, how to teach people what healthful eating is, how to convince them that healthful eating can be pleasurable, and how to put them into an environment in which healthful eating is relatively effortless, or at any rate no more effortful than whatever it is they do now to get food.

I want to come at this educational problem obliquely by asking a question of my own — a very important question, I think, but often neglected. Why do we have to have nutrition education at all? Obviously people survived for millennia before nutrition became a science — or a word. They survived by cultural transmission of eating patterns which kept them alive. "We must suppose," as Margaret Mead told the American Dietetic Association 30 years ago, "that in any culture which had too bad a pattern, the people perished . . . each pattern has been based on an empirical nutritional science; if it doesn't include at least the absolutely essential nutrients, the people would not have survived. No one knew what they were doing, no one knew why they ate the things they ate, but gradually over a period of time viable patterns have been established."<sup>1</sup> (I would not want to be heard to say that these were optimal patterns, only viable.)

And now, not at all gradually, over a comparatively short period of time, those traditional patterns have been drastically modified or eliminated altogether, not only here but in many parts of the world. In fifty years the number of products in the marketplace has doubled, and redoubled, redoubled and then redoubled again. Hunters and gatherers knew and ate an astonishingly large number of different growing things — perhaps as many as 800. The contemporary shopper, devoting considerably less mental space to the task of selecting a daily diet than her predecessors did, is supposed to choose wisely from 12,000 items, most of which did not exist in her grandmother's time and most of which bear an obscure, remote, and/or tenuous relationship to anything one might hunt or gather!

The hunter-gatherer child who went digging with Mom or hunting with Dad gradually learned where to get food and how to distinguish between the edible and nourishing and the non-edible and dangerous. The contemporary child, joining Mom for a stroll through the colored aisles of the supermarket learns to nag for Count Chocula and Mars Bars; and, in the local fast food shop, masters the litany of ordering a Big Mac and fries. Indeed, it has even been suggested by one author that food and ritual are mixed in such places just as they were in primitive societies. In a recent issue of the *Journal of American Culture* author Conrad Kottak argues that McDonald's restaurants have become our equivalent of holy places where our entire behavior is ritualized. In a McDonald's, as in church, he points out, you know who is going to be there, you know what you're going to be asked to say, you know what is going to be said to you, and you know what you are going to do. All of which gives a great deal of security to people in a society where so much change is chronic.<sup>2</sup>

In any case, the child who goes to the supermarket or the fast food shop is learning his culture's foodways. But in these places the parents' mandated choices are based on no painfully accumulated tribal wisdom. They are based on some vaguely held ideas about the limitless goodness of meat and the painful necessity of vegetables, on some poorly remembered concepts of "nutritional balance", and on a commercially encouraged fascination with

micronutrients (a fascination which enables endless products made largely of refined flour, sugar and fat, and a few mills worth of vitamins and minerals, to be sold as "nutritious"). The choices are based on "whatever tastes good" to Dad and the children, and on the fact that a product is "new." We have fully separated palatability from nutrition, as John Yudkin has pointed out, so that unlike other animals we are no longer assured of getting what we need as long as we just eat what we want.<sup>3</sup> In short, we need nutrition education because we have raised at least one generation which knows astonishingly little about the sources and kinds of foods on which humanity has survived through millennia. Indeed, we may have more than one such generation — we are now into a generation of "cooking-age" daughters to whom Minute Rice is just like mother used to make.

What is nutrition education? It is the replacement of folk wisdom about which foods are "good" to eat with wisdom acquired in some other manner about which foods are "good" to eat. Now that's not nutrition education as I present it to my graduate students in teaching them nutrition, or as Paul Lachance might give it to his graduate students, or as we are giving it to undergraduate students in departments of Home Economics (or Human Ecology) all over the country. But I would argue that it is nutrition education from the standpoint of the consumer. That was not my definition before I began the thinking for this talk, but I have come to realize that nutrition education must be a mechanism whereby people can learn what foods are good for them to eat, in a society which has eliminated the traditional routes whereby such information was communicated.

What sort of mechanism is best? We tend to assume it is an increase in what we call knowledge. And all too often in academic circles we define knowledge as something that television, for example, does not convey. We say television is not a good medium for teaching people anything — "anything" being what we define as knowledge — like the fact that the body temperature is normally 98.6°. We academics do not define "knowledge" as what I would call body wisdom, or the things we know about someone when we say we "know" that person. We do not define "knowledge" as what you can do as a result of watching your mother skim jam or watching your father use a wood plane. This is not "knowledge" as we define it. It was our kind of knowledge Margaret Mead was talking about when she observed that while people used to eat certain foods ritually because they had been given to them by the mother's brother, we can now eat them because we know they contain certain nutrients. "Now that we have nutritional science," she wrote, "it is possible to go a step further. We don't need to rely on habit and custom quite as much, and we can raise our habits to a higher level."<sup>4</sup> We can choose our foods, in other words, not on the basis of habit, but of knowledge.

We in nutrition like to believe that is so, since it gives us a justification for transmitting to others some portion of the arcane biochemical information we have so arduously acquired. Yet people are funny about food; and as the Armed Forces' own surveys show, most people do not choose the foods they eat because of health or nutrient content but because they like the taste of those foods, because the foods look good, and because they want something different than they had yesterday.

Which brings us to your question number one. What should be the goals of a nutrition education program for the Air Force? I think that question has to be broken down into

two subparts called **content** and **outcome**. If one is talking about the goals of a nutrition education program, and has to ask, first, what content it should aim to impart — that is what should be taught — and second, what ought to be accepted as evidence of the absorption of that content. Do you, for example, want Air Force personnel to come out knowing the Krebs cycle, the four food groups, the Dietary Goals or all of the above; and then what do you want them to do as a consequence of having this information? Will you be satisfied if they pass a test showing they have learned it? Do you want increased nutrition knowledge, changed eating behavior, or both?

Let me begin by suggesting, very arbitrarily, that you don't want to turn all the Air Force personnel into nutritionists, dietitians, or biochemists. You may want to teach them some simple nutritional chemistry, and some general relationships between nutrients and health. But whatever you teach, you are at some point going to have to teach them some kind of guide to food selection, at which time you will have to decide what attitude toward the American diet to accept as the basis for such a plan.

One viewpoint which has been hotly debated is expressed in something called Dietary Goals for the United States.<sup>5</sup> You have already had a workshop on the Dietary Goals so I do not intend to reargue that issue here. I will simply say that it seems to me to be beyond dispute that a rational National diet — and I assume such a diet would be appropriate for both military and civilian personnel, especially peacetime military personnel — would be a diet lower in fat, refined carbohydrates, and salt than the "typical American diet" and higher in vegetable protein and complex carbohydrates, especially as these occur in the form of grains, fruits, vegetables, and legumes. Despite all the furor around the Dietary Goals, I have yet to see any evidence that such a diet, consumed in the form of ordinary foods, would be anything but beneficial as a replacement for our present Dietary Patterns.

I shall not debate that point, however; my only reason for raising it is to point out that no matter what kind of nutrition education program you choose to have, you are going to have to make some kind of decision about a desirable food pattern. Even if you merely choose to teach nutrition using one of the standard nutrition texts, you will have to decide whether to continue the existing mythology that animal products are the primary and best source of protein or whether to instruct your charges on the questions that have been raised about the present U. S. dietary patterns.

Now, having made some kinds of choices about what should be taught, the next issue to be dealt with is what effect you want that content to have on the behavior of the learners. Is your goal to change the eating behavior of Air Force personnel, or are you content that they should know something of the science of nutrition? It is absolutely certain that if you set out to teach nutrition science you can do so with moderate success. It is almost as certain that if you set out to change behavior you can also do that; but it is quite uncertain that if you set out to teach nutrition science you will have any effect on behavior. I would hope you would include among your goals changing your students' eating behavior; for ultimately any program worth the paper it is written on must aim to help people make better decisions about which kinds of foods they ought to be choosing as they go through the day. The unstated assumption behind all nutrition education programs is that the present food choices of the participants are improvable. But if they are to be improved, some direct effort has to be made to change, not merely what people are thinking, but what they are eating.

I have belabored this point so long because I find it is not always understood nor acknowledged. Many people behave as if they believe that teaching nutrients is a good thing in its own right — and perhaps it is — at least we are taught to believe that one can never have too much knowledge — but in a world overcrowded with things to learn, I doubt if we could justify taking the time to learn nutrition if it were not clear that some benefit would derive from that knowledge.

Now, having devoted most of my remarks to one question, I shall devote exactly three minutes to the remaining three.

2) What educational programs are likely to attain the goals outlined above? An educational program focussed on the relationships between diet and disease and on the physiologic, social, psychological and economic factors that influence what one chooses to eat and what one has available to choose from. A program that involves the students themselves in analyzing and improving their own food consumption patterns. A program that involves serving tasty, attractive, and varied dishes (the three factors that affect selection) including many combinations of whole grains, beans, and other vegetable sources of protein and that emphasizes the serving of fresh — and often raw — vegetables and fruits. A program in which unfamiliar foods are served along with posters and other educational displays at the point of purchase to enable the participants to understand how what they are putting into their mouths ties in with what they are putting into their heads.

3) How can these programs be effectively organized and integrated? By deciding that you will devote time, energy, and person power to effectively organize and integrate them.

4) How can we assess whether these goals or objectives are being met? Conventionally, by doing knowledge and attitude surveys, about which I need not say more. More importantly, by doing various food selection surveys, serving identical meals at intervals throughout your educational program and monitoring food selection in relation to various educational interventions. During World War II, the Committee on Food Habits examined which kinds of poster appeals placed in a cafeteria would be effective in modifying food selection.<sup>6</sup> What kinds of appeals, if any, would be successful now in doing the same thing?

Finally, I would ask you a question. What kind of flexibility do you have in menu planning? Is that Worldwide Menu really Worldwide? Terrifying. Do you mean if someone is stationed in Singapore, they really don't get local food? Perhaps that explains your low attendance. I don't know whether you can make such modifications, but the most effective way that has been found to change student eating habits in high schools is to involve the students in helping plan the menus. Can you set up committees to do that? Can you localize your menus? Is what you serve tied in with what the government has too much of? I don't know the answers to those questions. I do know that you seem to me to have a tremendous opportunity to modify the dietary habits of young men at a time when such a modification may alter the whole course of their lives. I hope you find a way to do it!



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## EDUCATION ABOUT FOOD IS DIFFERENT THAN EDUCATION ABOUT NUTRITION

Paul A. Lachance

### DEFINITIONS

Awareness of food and nutrition is high, but few can define food or understand the specifics of food processing; and few can define nutrition or understand the specific nutrients. Yet, chemicals which are labeled nutrients have consumer credibility, but the chemical composition of food and the use of chemicals which are additives do not have the same credibility. Consumer attitude toward the addition of nutrients to food ranges from non-questioning and tolerance to an attitude of positive benefit. It is clear to me that consumer confusion, in part, can be attributed to communication gaps concerning the terms which we professionals have ill-defined. If one explains the terms, the chemical significance of food and its processing in an ever changing world becomes more meaningful.

Nutrition as a term has been misused. Most commonly it is defined as how the living organism uses food, or the effect of food on the living organism, but it is both. It should be clear that nutrition is not food and food is not nutrition. Nutrition is the sum of the biochemical and physiological processes concerned with the growth, maintenance and repair of the living organism and/or its constituent organs. It is the effect as well as the consequences of those food chemicals that have passed the lips. Food is any substance that is eaten or otherwise taken into the body to sustain physiological and psychological life, provide energy and promote nutrition. The substance of food is that array of chemicals called water, nutrients, colors, flavors, textures, and other knowns and unknowns.

### CONSUMER CONFUSION

There are many facets of food about which the consumer is confused. What was once taken for granted is now questioned, and more often than not, questioned for its health implications. Two major aspects of food which are most frequently questioned are first, its composition, that is, its ingredients, and second, its nutritive composition, that is, its nutritive value. The substance of food is that array of known and unknown chemicals which provide the organoleptic characteristics which are readily perceived by the consumer. These characteristics are color, flavor, and texture. In addition, there is an array of nutrient chemicals which provide its nutritive value. There are also present many chemicals which may or may not contribute to its organoleptic or nutritive value and may be chemicals which at higher concentrations would be toxic. A number of these natural chemicals are simply not perceived by the consumer. Examples of these are given in TABLE 1 where the composition of the flavor of orange juice is given. A number of these chemicals have lethal doses; however, the quantity present in food is so small as to be of no consequence in terms of lethality. We are also aware that certain foods may contain naturally occurring toxicants. These toxicants are more apt to be a problem if a particular food is mishandled, ill-prepared, or consumed in too large a quantity. A listing of a representative number of these foods and their naturally occurring toxicants is given in TABLE 2. It should be noteworthy that a household spice

such as nutmeg is toxic at 10–15 grams because of its content of myristicin, a hallucinogen, also present in mace, black pepper, celery, dill, parsley, and carrot. The naturally occurring alkaloid solanine in potatoes is a cholinesterase inhibitor and as such can be dangerous because it is not inactivated by heat during cooking. Potato storage and handling conditions and the genetic strain of the potato have definite effects on the concentration of this alkaloid.

**TABLE 1**  
**THE TOXICITY OF SOME INDIVIDUAL NATURAL FLAVOR CONSTITUENTS**  
**FOUND IN ORANGE JUICE\***

Natural Flavor Compound	Oral Lethal Dose 50% of Animals
Acetal	**
Acetaldehyde	1930 mg/kg rat
Acetone	5300–9750 mg/kg rodent
1-Carvone	**
Citronellal	**
Citronellol	**
Citronellyl acetate	**
Cymene	4750 mg/kg rat
n-Decanal	3730 mg/kg rat for 1-Decanal
Ethanol	5.5–14.0 gm/kg rodent
a-Ethyl butyraldehyde	**
Ethyl butyrate	**
Ethyl-n-caprylate	**
Ethyl formate	**
2-Ethyl hexanal	**
Furfural	275 mg/kg rat for furfuryl alcohol
Geranial	**
Geraniol	**
n-Hexanal	4890–9510 mg/kg rat
2-Hexanol	**
3-Hexene-1-ol	**
2-Hexenal	780 mg/kg rat
3-Hepten-1-ol	**
d-Limonene	5.6–6.6 gm/kg mice
Linalool	**
Methanol	13 gm/kg rat
Methylene chloride	**
Methyl-n-caprylate	**
Myrcene	**
Neral	**
Nerol	**
n-Nonanal	**
n-Octanal	5630 mg/kg rat for 1 Octanal
n-Octyl butyrate	**
a-Pinene	**
b-Pinene	**

TABLE 1

THE TOXICITY OF SOME INDIVIDUAL NATURAL FLAVOR CONSTITUENTS  
FOUND IN ORANGE JUICE\* (Cont'd)

Terpinen-1-ol	**
α-Terpineol	**
Terpinyl acetate	**
n-Undecanal	**
Valencene	**

\*It would be impossible to consume sufficient orange juice to elicit toxicity in humans. The chemicals of natural orange juice cannot be said to be innocuous because they are "natural."

\*\*Unknown or not documented

TABLE 2

## SOME NATURALLY OCCURRING TOXICANTS IN FOOD

FACTOR	DISEASE POTENTIAL	FOOD
Allyl isothiocyanate	Skin irritant	Horseradish, mustard
Amines	Can elevate blood pressure with certain tranquilizers; can cause death	Natural cheese, Chianti (wine), yeast extracts, bananas, pineapples, tomatoes, pumpkins, squash, cucumbers
Antivitamin factor	Vitamin deficiency symptoms	Raw egg white, clams, raw fish, linseed meal, corn (and other cereals), oranges, raw soybeans, fish and vegetable oils, raw kidney beans
Capsaicin	Skin irritant	Red pepper
Carcinogens Safrole	Found to cause cancer in mice	Cinnamon, nutmeg, sassafras
Tannic acid	Known to cause liver tumors in rats	Tea, nuts, fruits
Benzopyrene	Known carcinogen	Cabbage, charcoal-grilled meat, spinach, lettuce, tea
Enzyme inhibitors Trypsin	Growth retardation in animals	Soybeans, kidney beans, lima beans

**TABLE 2**  
**SOME NATURALLY OCCURRING TOXICANTS IN FOOD (Cont'd)**

<b>FACTOR</b>	<b>DISEASE POTENTIAL</b>	<b>FOOD</b>
Chymotrypsin	Growth retardation	Irish potatoes, egg whites
Cholinesterase	Block transmission of nerve impulses	Radishes, carrots, celery, potatoes, broccoli, eggplant, sugar beet, asparagus, Stayman apple, Valencia orange
Solanine	Cholinesterase inhibition, teratogen, abortion, and fetal resorption agent	Potatoes (blighted or stressed)
Glycosides Cyanogens	Cyanide poisoning	Lima beans, cassava, almonds, black-eyed peas, wild black cherries, kidney beans, peach pits, apricot pits, choke cherry pits, Bengal gram, Red gram
Goitrogens	Goiter	Soybeans, rapeseed, white turnips, cauliflower, peaches, pears, strawberries, Brussels sprouts, spinach, carrots, rutabaga, cabbage
Glycosides of some honey	Heart stimulant	Honey from bees obtaining sugars from mountain laurel, rhododendron, azalea, oleander
Naringin	Stomach irritant	Unripe grapefruit
Gossypol	Poisoning of farm animals, reproduction problems in rats and chickens, cocarcinogen in trout	Pigment gland of cottonseed
Hemagglutinins	Growth inhibition	Soybeans and other legumes

TABLE 2

## SOME NATURALLY OCCURRING TOXICANTS IN FOOD (Cont'd)

FACTOR	DISEASE POTENTIAL	FOOD
Hydroxyphenylisatin	Laxative	Prunes
Lathrogens	Lathrism (disease of the nervous system, bones, and connective tissue)	Peas: <i>Lathyrus sativus</i> , <i>L. cicera</i> , <i>L. clymenum</i>
Metal binding factors Phytates	Interfere with calcium absorption	Cereal
Oxalates	Interfere with calcium absorption	Spinach, cashews, almonds, cocoa, rhubarb, Swiss Chard, beet tops, parsley, celery, currants, prunes, beans, soybeans
Menthol	Cardiac arrhythmia	Liqueur
Myristicin	Hallucinogen	Nutmeg, carrots, celery
Nitrates (and nitrites)	Cocarcinogen methemoglobinemia	Spinach, smoked foods, green leafy vegetables
Stimulants (caffeine, theobromine, theophylline)	Hypertension	Coffee, tea, cocoa

Table adapted from Packard, V. S., Processed foods and the consumer. Univ. of Minn. Press, Minneapolis 1976.

The message that the consumer must begin to understand is one of perspective which begins with the foods that they are familiar with and which by some advocates are called natural, and thus believed to be "OK" or free of dangerous chemicals. Natural food is better defined as intact food, that is, the garden variety of the animal type readily recognizable as food tended by labor and attention.<sup>1</sup> Newer foods, however, have entered into the market over many years and particularly during the last twenty years or so. Two types of foods are involved. These are formulated and fabricated food products. Formulated products include bread, which dates from the days of the Pharaohs, and more recently ready-to-bake oven rolls or box cake mixes or cookie mixes. These foods are for the most part products made from recipes not dramatically different from those found in a classical cookbook. However, for the benefit of mass production and extended shelf life, other functional ingredients may be added which are called food additives.

A more complicated food form is called **fabricated food** which is derived from the assembly of various **partitioned food**. A **partitioned food** is the one which is derived by the fractionation of an intact food. For example, corn can be fractionated into relatively pure products: corn oil, corn starch, and corn gluten. Cottonseed can also be fractionated into cottonseed oil and cottonseed flour. Soybeans are fractionated primarily into soybean oil and soybean flour. Soy flour can further be refined to a concentrate at 70% protein or an isolate at 90+% protein. We have learned that one can restructure protein and so one can fabricate particles that emulate meat or other foods. In producing a fabricated food, other partitioned ingredients such as starch and oil may be used, and in addition the desired organoleptic characteristics must be added as food additives to obtain specific colors, flavors, and texture characteristics. What often also must be added are nutrients because these are compromised in the process of fractionation. The intent of partitioning is not to remove nutrients but to obtain stable products. Residual metals for example in an oil will cause it to either oxidize readily, change color, or undergo some form of reversion giving a rancid flavor. It is essential then for the consumer to understand that there are various food choices, some of which are new technologies and which can be beneficial to man.

A completely chemical diet which the average consumer has absolutely no familiarity with is the elemental diet. It is now used in increasing quantities in the sustenance of patients. These diets made up of either pure amino acids or a whole protein plus one carbohydrate, usually glucose, and the necessary vitamins and minerals plus flavoring make sustenance in certain clinical conditions more favorable than nominal foods would otherwise be able to make possible. An example is a low phenylalanine preparation for phenylketonuric patients.

Sophistication of these technologies have made possible meatless, imitation fish and meat products, even weiners which are soy based and have no relationship to meat *per se* other than their appearance and color and flavor. Hamburger extenders are similar products. A more useful analog product has been the fabricated infant formula products based on soy protein. These products are very important to infants who are allergic to milk.

Food additives have become a very misunderstood series of chemicals or ingredients. Most consumers don't understand that most recipe ingredients are also food additives; thus if a homemaker or a food technologist adds mustard, black pepper, yeast, garlic, salt, or similar compounds to a food, he is adding a food additive. By law a food additive cannot be added unless it has a specific function or purpose. It must also have been determined to be safe and it must not deceive. In TABLE 3, a classification of food additives by functional class is listed. There are about 4,000 food additives, 2,000 of which are flavor components. Of course, the consumer does not have that many pure compounds in the kitchen. However, many of the compounds the consumer uses to obtain a particular functional property during cooking utilizes or brings along with it many other chemicals which have no particular role in the functional property desired. For example, the use of eggs as a means of obtaining emulsification properties in cakes and other products can be solved by using only one or two emulsifiers of a more pure type (e.g. diglyceride, lecithin) in a processing situation.

**TABLE 3**

**CLASSIFICATION OF GRAS SUBSTANCES BY FUNCTIONAL EFFECT**

1. Anticaking agents, free-flow agents
2. Antimicrobial agents
3. Antioxidants
4. Colors, coloring adjuncts (including color stabilizers, color fixatives, color-retentive agents, etc.)
5. Curing, pickling agents
6. Dough strengtheners
7. Drying agents
8. Emulsifiers, emulsifier salts
9. Enzymes
10. Firming agents
11. Flavor enhancers
12. Flavoring agents, adjuvants
13. Flour-treating agents (including bleaching and maturing agents)
14. Formulation aids (including carriers, binders, fillers, plasticizers, film-formers, tableting aids, etc.)
15. Fumigants
16. Humectants, moisture-retention agents, antidusting agents
17. Leavening agents
18. Lubricants, release agents
19. Nonnutritive sweeteners
20. Nutrient supplements
21. Nutritive sweeteners
22. Oxidizing and reducing agents



TABLE 3

CLASSIFICATION OF GRAS SUBSTANCES BY FUNCTIONAL EFFECT (Cont'd)

23. pH control agents (including buffers, acids, alkalies, neutralizing agents)
24. Processing aids (including clarifying agents, clouding agents, catalysts, flocculents, filter aids, etc.)
25. Propellants, aerating agents, gases
26. Sequestrants
27. Solvents, vehicles
28. Stabilizers, thickeners (including suspending and bodying agents, setting agents, gelling agents, bulking agents, etc.)
29. Surface-active agents (other than emulsifiers, including solubilizing agents, dispersants, detergents, wetting agents, rehydration enhancers, whipping agents, foaming agents, defoaming agents, etc.)
30. Surface-finishing agents (including glazes, polishes, waxes, protective coatings)
31. Synergists
32. Texturizers

Source: Adapted from Federal Register, 1974, 39(185):34175

Consumers do not understand that there are advantages to food additives even though some food additives have been withdrawn because of new knowledge concerning their risk. The fact that they can be removed is proof of the advantage of food additives. Knowing which compound was added and how much was added is very important if one subsequently decides to ban it (e.g. Cyclamate, Red No. 2). This important control is impossible to apply in the instance of foods contaminated by microbial toxins or naturally occurring toxicants.

It should be apparent at this state that communicating food, nutrition, and health information to the consumer is not simple. At least two types of information would have to be provided in terms of compositional and nutritive values. If one has ingredient labeling including open labeling on all standards of identity foods, then the problem becomes one of how to describe the compounds involved and the significance of this information to the consumer. The second category is that of providing nutritional information on the label. Whether the consumer is the homemaker, a customer at a fast food stand, a regulator, a politician or a physician, the problem of how to communicate food composition to all is a matter of perspective. This perspective must consider the function of foods, the socio-cultural attitudes

towards food, and the problem of functional illiteracy which handicaps the consumer from understanding the label.

## FOOD FUNCTIONS

While the gourmet is likely to emphasize the gustatory aspects of food, and the nutritionist is likely to emphasize the nutritive value of food, neither is considering the total role of food in our daily lives.

On any given occasion, food has several of the following functions:<sup>2</sup>

1. To provide energy (satisfy hunger).
2. To provide nutrients (satisfy hunger).
3. To initiate and maintain interpersonal relationships with friends, kinsmen and strangers. (Food is an organizing force and fosters social relationships; for example, a coffee break serves to meet new people, express frustrations, gossip, boast of achievements, explore problems, enhance self identity, nurture cohesion, communicate life experiences, and work out personal problems, but by definition the coffee break is a short recess from routine work.)
4. To determine the nature and extent of interpersonal distance. (A man invites a woman out to lunch for a variety of reasons; a salesperson takes a customer to lunch with the hope of transacting business leading to a commission.)
5. To express socio-religious ideas. (Thanksgiving and Christmas; parties in connection with Christenings or Confirmations; the Jewish dietary laws; the Seventh Day Adventist dietary laws.)
6. To express social status, social prestige, and special individual or group achievement. (Sweet Sixteen, Graduation, 25 years of Service, Retirement.)
7. To cope with psychological stresses and needs. (Snacking, hoarding, gorging, compulsive eating, fasting; for example, students during exam periods eat too much or eat very little — a few remain normal.)
8. To reward, punish, or influence the behavior of others. (Children irritate parents by not eating, being finicky eaters or messy eaters; parents irritate children by restricting food such as dessert if other food such as a vegetable is not eaten.)
9. To influence the political and economic status of a group. (State and political banquets, food for relief or/and food stamps in the USA, the import and export of food commodities.)
10. To detect, treat, and prevent social, physical and cultural behavior deviations and illness. (Food borne disease, therapeutic diets, foods chosen when ill, hyperactivity diet.)

## FOOD ATTITUDES

Food practices also are related to our response to social changes.<sup>3,4</sup>

With World War II, women in substantial numbers entered the work force, and the two income family budget was discovered. The middle class broadened but the "traditional" attitudinal characteristics of conformity, family, self denial, and "duty before pleasure" remained strong. The grey flannel suit and the Basic Seven or Four Food Guides were in. The 1960's brought Civil Rights marches, student revolts, permissive child rearing, a weakening in church attendance. The overall attitudinal shift was from overall society goals toward issue goals closer to home. Food became what is convenient, and clothing became what is comfortable. The 1970's saw a crystallization of mistrust in anything big: government, industry, and even church. The overall attitudinal shift has been from issue goals to self goals. What is in it for me? The talk is gourmet food but time is precious so the practice is eating out. Of course, not everyone changes, and those that did evolve, did so at different rates.

The traditionalists are "old line" and especially if not well educated (less than high school) are not about to evolve. Archie Bunker has a lunch packed for him and believes in stepping out for a beer but not for meals. If educated, the traditionalists do relinquish their ethic — but very slowly. They remain moralists and believe in regular meals. This particularly is true of the older middle class woman, but after retirement these changes depend upon income. If the income is fixed, the possibilities are restricted. If the income is satisfactory, new adventures are witnessed, if not actually experienced. (A trip to Hawaii to watch surfing but not to surf.)

That is not true of the adult children of the traditionalists. They couldn't wait to get away. The "in" and "on the go" singles and marrieds are employed, focused very much on self (try it you'll like it, and we each have a career) and they eat out. The three square meal pattern is rarely apparent. In fact their meal patterns are individualized! Breakfast is something special (Sunday Brunch or at "Brennans") or a meal after working the night shift — otherwise its a snack at coffee break time. Lunch is anything eaten between the morning coffee breaks and some evening meal, which may be picked up (from leftovers and/or food in the house), at a restaurant, or just a series of snacks. All in all, two-thirds of the North American population is evolving in its attitudes. Included in the "on the go" majority are some young people who go through an aimless stage with drugs, liquor, and high jinks. They live for today and food is what you happen to want at the moment.

A substantial percentage of all age groups experience organized food service. For some it is involuntary food service in terms of access to food, menu and time of meals — elementary schools, hospitals, prisons and nursing homes, or it is organized voluntary food service in terms of a pre-set location, prescribed but broad time periods for access, and some menu choices — high schools, colleges, and institutional cafeterias.

In addition to these scheduled mealtimes, fast food meals are available from 10 a.m. to 10 p.m. and often 24 hours per day. In contrast, restaurants operate defined hours but usually for the business lunch period and the dinner period. The latter is opted by the traditionalist as well as the "in" crowd. Leisure time and atmosphere being the additional necessary attributes

which contribute to the decision favoring a restaurant over a fast food outlet.

It is fairly common knowledge that: (a) at least one of every three food dollars is spent away from home; (b) the food service market is growing more rapidly than the retail food selling market; and (c) fewer of the household food shoppers are home to leisurely shop and the shopping is for families that are smaller.

Other practices which reveal attitudinal changes toward away-from-home eating include marketing evidence that three-quarters of families do not eat breakfast as a family unit and up to fifty percent of families have school children. With over fifty percent of women in the full-time work force, a minority of parents have anything to do with the breakfast of their children on school days (which are also work days). Further, all the individuals in these households are partaking in away-from-home meals at lunch time. School lunch and the business lunch are stylized, but no lunch, yogurt lunch, brown bag lunch, machine vended lunch, and fast food lunch are alternatives. These food decisions are based on an unpredictable selection of preferred foods but with little or no concern for nutritive value. The concern for nutrients is manifested in a different manner. In over fifty percent of households, vitamin supplements are regularly available (as insurance). One-third of all U.S. adults consume a daily vitamin supplement.

The dinner meal for the "on the go" ranges from twenty-five percent planned, twenty-five percent "pick-up" from inventory and the remainder (fifty percent) eaten away from home. Some seventy-five percent of individuals eat something between dinner and bedtime. To complicate matters, at any given time twenty-five percent of adults are "on a diet."

If one places all this information together, it should indicate that government officials and consumerists who advocate labeling retail food and restaurant menus as an ideal education tool are naive. Marketing psychologists<sup>4</sup> state that the reason the consumer favors more information on the label, even though it is not completely understandable, is because it is a source of control or power over big business and big government, both of which are distrusted. The evidence we have points to: (a) a need for developing and implementing simple yet diversified communication techniques. Implementation should not occur before the effectiveness of the technique in terms of audience and impact is predetermined; (b) the avoidance of haphazard and quasi political regulatory solutions. In this latter category are solutions based on political hearings which are often the basis for legislation concepts.

## FUNCTIONAL ILLITERACY

Functional illiteracy has been brought to the attention of the American public in the last three years. This does not mean that the consumer is illiterate in the sense of reading or writing but that the consumer is unable to interpret the information which is presented to him. The study at the University of Texas<sup>5</sup> demonstrated that 20% of American consumers are functional illiterates and that another 30% are marginal. These types of statistics coincide with studies which show that about 50% of consumers understand or have a reasonable knowledge and awareness of nutrition and food issues.<sup>6</sup> These latter consumers are very apt to have an above average income and higher educational attainment. Whereas, the individuals who have functional illiteracy are most apt to be of low socio-economic status and of minimal education.

## FOOD AND NUTRITION EDUCATION COMMUNICATION

Proposals which might help to improve communication must be comprehensive (TABLE 4) and must include a method to simplify the conveying of nutrition information to the consumer, for example, a redesign of nutrition labeling to convey information which is on the label but not calculated for the consumer such as the caloric density of the product. The label now offers information on nutrients present and to what degree (% U.S. RDA), and also the calories per serving, but we do not tell them what the average caloric penalty is for the average nutrient present (TABLE 5). This type of product information has little or no relevance in food service systems.

TABLE 4

### FOOD AND NUTRITION EDUCATION GOALS

1. To increase awareness of the role of food practices in realizing personal and family health and performance goals.
2. To understand the basics of food preservation and processing principles, and the food alternatives available to all consumers.
3. To understand the role of nutrients as well as non-nutrients in human biochemistry and physiology and be able to assess various commercial or prescribed "diet" alternatives.
4. To understand the role of overall dietary practices in meeting the developmental and weight control needs of infants, children, adolescents, pregnant and lactating women, active men and women, and the elderly.

TABLE 5

### CALORIES FOR NUTRIENT (kcal/US R.D.A.)\*

Effect of choice made or preparation used:

Potato:	Boiled	9-10
	French Fried	20
	As a chip	40
Milk:	Full-fat	13
	Two percent fat	9-10
	Skim	7
	Yogurt (low-fat)	21

TABLE 5

## CALORIES FOR NUTRIENT (kcal/US R.D.A.)\* (Cont'd)

## Vegetable:

Peas, Frozen	7
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Peas, Canned	10
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Fruit: Pineapple, Canned, no sugar added	33
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Pineapple, Canned in syrup	47
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## Other (formulated) foods:

Rolls, Hot Dog	24
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French Toast (frozen)	20
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Macaroons	30
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Cake Mix (average)	50
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Chocolate Bar	50
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\*A simple measure of nutrient density:

The average US R.D.A. per serving divided into calories per serving reveals number of calories for average nutrient. If it were possible to subsist on such an item, 100 times the CFN number could be the number of calories one would have to ingest.

The most significant intervention one could make would be a long range program of systematic food and nutrition education at the elementary school level. To accomplish this one would have to reach approximately 50% of the teachers, particularly those concerned with science, home economics, physical education and other disciplines which relate to nutrition and health. In order to impact the more needy in society, the expanded nutrition education program of the USDA Cooperative Extension Service now in effect in each state of the nation should be optimized to include training in the area of food science and technology which is more sophisticated than training in foods. One might wish that more final training in nutrition and food science were possible at the level of medical schools. However, I believe the physician is not a prime communicator in this field of preventive health as it pertains to diet. It would be advantageous if courses in nutrition and food science were prerequisites to a medical education. A more significant force is the dietitian (26,000 Registered Dietitians) who has

had training in nutrition but rarely adequate training in food science. This is slowly changing, and more and more institutions of higher learning are providing courses to sophisticate the nutritional knowledge of food scientists as well as the food science knowledge of nutritionists. This has been accomplished by the merger of food science and foods and nutrition programs, but a redefinition of the curriculum required for accreditation as a Registered Dietitian is still a need. Short Courses should also be required of marketing and public relations personnel. Such a requirement would have a significant impact on the quality of food advertising and would thwart attempts to control advertising by federal regulations which may infringe on our right to free speech. The approaches to a more informed consumer should be evident: targeted food and nutrition education rather than ill-defined, unsystematic, sporadic, incomplete, and uncoordinated legislative and advertising efforts!

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## THE MILITARY CONSUMER: COMMUNICATING THE BASICS OF NUTRITION

Johanna Dwyer

### What Should Be the Goals of a Nutrition Education Program in the Military?

The goals for nutrition-related measures in the military are two-fold as I see them. First, to foster healthful food consumption practices, especially in the troops, but also in their families. Second, to integrate nutrition concerns into military institutional systems having to do with food and health. The rationale behind these goals in peace is to project an image of competence so as to deter those who might otherwise attempt to wage war, and in wartime, to fight.

As I understand it, the Armed Services are presently undergoing a transition as to how the fundamental goal of its nutrition policy is achieved. I interpret this fundamental goal as being to foster healthy food consumption practices to assure satisfactory nutritional status in military people and thus to provide for the defense of our country. At many points in the past, this was achieved by providing a nutritionally adequate diet directly to everyone in the military. Nutritional adequacy was, and apparently still is, defined by the military as assuring that nutrient supplies provided meet the Recommended Dietary Allowances. A second objective related to this, preventing obesity, has been institutionalized by the requirement that military people stay physically fit both by modification of energy outputs and by the provision of special menus which those who need to watch their weights may choose to eat. The provisions for attention to energy output and fitness are laudable, but the strategies to achieve them (that is, compulsory measures) are unique and unlikely to be transferable to other parts of society.

However, since less and less of the military person's food intake is provided for directly by the Military today, the Armed Services are faced with a new challenge: making an adequate, nutritious food supply accessible to everyone. This is quite a different task than providing the food directly, since the burden of responsibility is on the individual, rather than on the institution, to see that his or her needs are met. This changeover in responsibility is analogous to the differences in strategies which occur between delivering an adequate diet to a patient who is bedridden in a hospital and getting this same patient to eat in accordance with his or her special needs upon returning home and being on his/her own. In the former situation, the institution has the upper hand; in the latter, it is the individual. Each individual must be motivated and provided with the means to achieve the nutritional objective in free-living situations to a much greater extent than when their food needs are provided for by the hospital's services. Food preferences, life style, cost and other characteristics having to do with dietary choices also loom much larger as issues to be coped with, if dietary recommendations are to be followed. No doubt one of the reasons for this conference is that the Military is trying to improve its efforts in these directions.

In addition to having to cope with alterations in logistics, to accomplish the goal of assuring nutritional status of military people, other and as yet unresolved issues have arisen. Chief among them is the ongoing debate about how a "nutritionally adequate" or "optimal diet" is to be defined. Resolution of the question, of how a "nutritionally adequate" or "optimal diet" is defined, will inevitably always involve judgement and be subject to change, since dietary



recommendations depend upon the state of scientific knowledge and perceptions of problems which must be dealt with. While the time frames and specifics are not at all clear, it is inevitable that in the future such definitions will increasingly stress some limitation of consumption of nutrients or other substances in the diet which are known to cause, or are suspected of causing, undesirable effects. Such an increased **emphasis toward moderation** of American dietary patterns and limitations of various foods and food constituents is bound to affect the Military. Since the Military prides itself on preparedness, it therefore behooves us to consider what the implications are likely to be upon military people and what steps might need to be taken at present.

## **1. Availability of Prudent Options and Choices for Military People**

First, a step which, at least in my view, is not likely to be warranted but which many military people nevertheless appear to be unduly concerned about, is imposition of the Dietary Goals for the U.S. or some similar set of guidelines upon the daily rations for the Military. Colonel Canham discussed this issue at length in the conference on Dietary Goals<sup>4</sup> in the Military and expressed the fear that the military people and their families might be used as "guinea pigs" in some such manner. I agree with his concerns and believe that such measures would violate the constitutional rights of citizens who happen to be in the Military. At the same time, however, the military person should not be served meals in military installations which preclude those who wish to follow these or other dietary guidelines from doing so. It seems to me that in the realm of food provision those charged with this function would do a service by seeing to it that choices were available which would permit those who wished to eat in line with prudent recommendations with respect to type and amount of fat and carbohydrate and amount of energy, sodium, and cholesterol, and to do so while meeting needs for other essential nutrients. Food preferences, cost, the availability of special or surplus commodities to the military are all other necessary considerations in planning master menus. But if these factors alone are considered and no attention is paid to **presenting prudent choices** as an option to military eaters, it would seem to me that they will be deprived of choice. I am not clear in my own mind as to whether such choices already exist in the menus served in military facilities. If they do, this is commendable. If they do not, in order to be prepared for the future, greater efforts to present such options would seem warranted. In my view the federal government and the public purse have the obligation to provide the dollars necessary to make this a reality.

## **2. Dietary Guidelines for Military People**

Food or eating guides for military people; like those for other citizens, are suggestions or recommendations, not orders. Such guidelines must necessarily cover topics such as achieving adequacy with respect to essential nutrient intakes and the prevention of obesity. But those who do want dietary advice also want information which speaks to issues having to do with moderation or prudence with respect to intakes of various foods and food constituents. Those who do not want dietary advice are not interested in either the questions of adequacy or superfluity with respect to nutrient intakes.

There is somewhat more of a consensus in the nutrition science and health communities at present about levels of intake which can be recommended for achieving adequacy of essential nutrients and energy balance than there is for how much is too much, or what constitutes overconsumption of a given nutrient. However, no nutritionists are on record as suggesting that Americans need more saturated fat, sugar, alcohol, cholesterol, or sodium to be healthy than they are eating now. The question is whether lesser intakes are warranted, and if so, how much less and for whom?

Nutrition educators are therefore faced with the task of providing guidelines which present prudent options for those who wish to follow them without giving advice which promises more than it can deliver. In order to accomplish this aim, **dietary guidance must be couched within an overall framework of preventive medicine and attention to all the environmental risk factors which alter the prevalence of chronic degenerative disease.** The military potential in this regard is much greater than that of other societal institutions since in many respects the military health care system has paid greater heed to preventively oriented measures, and attention to these concerns is more fully integrated within the basic mission of the Armed Services than is the case of most other work settings. Therefore, nutrition educators in the Military have a built-in advantage in getting across prudent messages about diet in a comprehensive health oriented context.

### **3. Other Kinds of Advice Relating to Nutrition for Military People**

Many of the conditions of life for military people are different than those of the average American citizen. While these are most apparent in time of war, even in peacetime the geographical mobility of military families, special conditions of work, some lifestyle characteristics and their food supply sources differ from that of civilians. Therefore, military families may need special advice or help in certain areas. The types of special advice range from certain measures which may be warranted for those working and living in unfamiliar climates to the obligation to provide therapeutic diets for those who need them in order to maintain their nutritional status. **Dietary advice must be in line with the realities and exigencies of military life if it is to be followed.** Thus, while dietary guidance may be similar to those for the average citizen, generalities applying to military life and individualization are also important. For example, one can contemplate educational and informational efforts which revolved around military eating facilities, commissaries, or post exchanges. Educational efforts to help members of the Armed Services and their families adjust to new environments might also be useful.

### **How Can Programs Be Effectively Organized and Implemented?**

Since the Armed Forces serve the public, tax dollars support them. In order to accomplish these nutrition education goals, the citizenry of the country and its representatives in Congress must be convinced that the goals are worthy and deserving of financial support. Therefore, it is important that these goals be regarded as important, not only at the highest levels within the Military but within the Congress and at the highest levels within the executive branch of the Government. While at least one recent report on nutrition research and policy needs

has stressed the unique and particular needs of the Military<sup>1</sup> with respect to both research and applied programs, other reports have ignored them. Indeed, the task force report on food and nutrition of the President's Reorganization Project did not even consider the Military,<sup>2</sup> even though it is the single largest food consumer in the country. Similar omissions of attention to the Military were also present in a recent study of nutrition information materials distributed by the federal government.<sup>3</sup> I call attention to these omissions not to criticize these documents, which have many positive features, but to underline the fact that **the Armed Forces often tend to be forgotten** when positive recommendations having to do with nutrition information and education are made. Thus the resources necessary to mount such programs may also be omitted from budgets, although criticism and scrutiny on the part of the public probably will not. This sort of "double bind" is difficult for those in the Military to live with. I believe that those of us in the general public, as well as professional and voluntary associations and those within the Armed Forces at the highest levels, need to call attention to its special needs, if this situation is to be avoided.

The current belief is that the needs of military people with respect to nutrition research, education, and information are more or less the same as those in the general public, and that **therefore the Military should rely on other agencies to deal with these problems.** But some needs or circumstances are special or different from those of the rest of the citizenry and thus special mission oriented efforts within the Military are vital to accomplish the overall goals as well as the Department of Defense's broader mission. Military families are beset by separations, lack of government housing, high rental rates in the surroundings of some camps, sometimes broken homes, and other special problems. Incomes are often not particularly generous. Thus, while the Forces themselves may be well fed, there may be several problem areas, especially among dependents.

Let me briefly mention two very nettlesome problems which have bothered me, and perhaps some of you, for a long time.

First, is the rationale for the weight guidelines you are using for females in the Armed Services. As I understand it, the Services have maximum allowable weights for a given height. I take it the rationale for this is that you are interested in making sure that personnel are fit. Weight for height is taken as an index of obesity, and obesity in turn is taken as an index of lack of fitness. The fact is that this is sometimes, but not always, true; just as a relatively high weight for height is not always indicative of obesity, fitness may or may not be negatively affected. What concerns me greatly is not these assumptions, however, but the fact that these standards are not always applied uniformly to the two sexes across the Armed Services.

In one recent publication for one Armed Service, the maximum weights for women given were the median of persons of a medium frame for that height using the Metropolitan Life Desirable Weight Tables, while the maxima for men correspond to the large frame. There is the danger of excluding women who are heavy because of their muscle, not their fatness, contributions to weight by having such a differential standard. The problem is especially acute at younger ages. It does not make scientific sense, and it makes one wonder whether or not cosmetic considerations have not been confused with fitness and health concerns in the case of these women. Also, apparently the Services differ on their weight maxima. If health

and fitness considerations are the basis for the concern about weight, surely all of those in the Services should have the same standard. I trust you will enlighten me on the decisions which have brought about this puzzling state of affairs.

A second continuing concern of mine is the issue of nutrition education and services for dependents of, as well as those enlisted in the Armed Forces. It is unclear to me whether the linkages with other agencies such as USDA and HEW, which provide informational and educational materials and food assistance, are as strong as they might be for military families. I also have the impression that there is no clearly designated person on many bases that personnel can turn to for advice, guidance, and assistance on their own nutrition and on feeding their families. As you presently train your health education personnel, are they really equipped to give useful advice in these areas? The ideal solution here would be a dietitian on every base who could devote a good deal of time to ambulatory nutrition issues. The next best solution is better training of others to furnish such advice, and greater efforts on the part of program personnel in other agencies devoted to military families' food and nutrition related problems.

Where, in the halls of the Pentagon, is there concern about these and related issues?

Implementation of three recommendations of last year's workshop<sup>4</sup> would do much within the military to accomplish this:

(1) Appointment of a nutrition advisory group to assist the Secretary of Defense in formulating and implementing a nutrition policy.

(2) Re-evaluation of the role of nutrition to the objectives of the military and a focused reconsideration of its deemphasis in the DoD research program.

(3) Continuation of the existing excellent programs studying the relationships among nutritional factors, stress, and performance.

In addition to these points, it is important for the public to realize that the Military's efforts contribute to nutrition and health in many areas, such as organization, rations development, and research and application in preventive medicine. Since a large part of the military organizational structure deals with housing, food, and medical support, it furnishes a vital resource to society as a whole for disasters. These capabilities of the DoD need to be more widely recognized and supported by the public. Now that the Volunteer Army is a reality, which has the effect of spreading costs over all of society rather than simply over those who serve, the Defense Department's need to impress the public with its many contributions over and above its primary defense function deserves greater emphasis.<sup>5</sup>

Because of my unfamiliarity with all of the special needs of the Military, I must rely on the opinion of others who are more familiar with it for establishing specific objectives. Last year's workshop on Dietary Goals in the Armed Forces developed several recommendations which suggest two useful objectives:<sup>4</sup>

(1) Develop comprehensive programs designed to modify energy intake and expenditure for correcting and preventing obesity and overnutrition. The evidence reviewed there suggested

that interventions to reduce energy intake would probably have to involve broad changes in policy having to do with menu planning, food purchases and so on. Changes directed solely at informational measures or at the level of the dining hall were thought to be unlikely to be effective. That is, in nutrition education, just as in defense, what you do is more important than what you say.

(2) Develop nutrition education programs to correct current nutritional problems and prevent such problems from occurring later in life. Both military personnel and dependents need to be considered here.

The goals and objectives which have been outlined and those additional measures which have been discussed previously in this conference are worthy ones. Before we think about programs, however, we need to consider the structural and organizational characteristics of the institution we are talking about. No educational or informational system which ignores the institutional structure within which it is to be implemented is likely to succeed.

Because the Military is a somewhat more all encompassing system in the sense that it touches the lives of its people in myriad ways, the opportunities for nutrition education of military personnel are different and more exciting than those which might be possible in other institutions. The first step toward realizing the potential is instilling nutrition or food awareness at all levels. While the awareness is already there at the highest levels (although it is not being matched always by action), it would be helpful to have an explicit policy and objectives. At the lowest levels, nutrition awareness does not seem to be a very high priority in the troops' minds according to several surveys conducted by Meiselman at DoD installations.<sup>4</sup>

The most important thing which needs to be instilled is an awareness of nutrition as being the outcome of all the related systems — food, health, and education within the Military and in the larger society.<sup>5,6</sup>

The first relevant aspect of structure which strikes me as being relevant to nutrition education is the Military's considerable power as a consumer and caterer of food to its members.

As I understand it, a large part of the food required by the Military Services is purchased centrally by the Defense Personnel Support Center of the Defense Supply Agency. This Center, in turn, sells the food, at cost, to the Military Services. In one report for 1973 the Center reported sales of \$536 million for troop feeding and \$310 million to resale commissary stores.<sup>7</sup> No doubt as reductions in force have occurred, the scale of purchases has decreased, but this Center still must be the country's largest single consumer. In view of this tremendous purchasing power, it is interesting to think not only about how this giant behaves as a consumer, but also what effects the giant might have on the rest of the country by its purchasing habits and specifications. It is difficult for a layman such as myself to find out very much about what the Center's "food habits" or "preferences" really are. One report, now quite old, criticized the Center for its inability to respond effectively to variable market conditions and to depart from rigid specifications, which resulted in high costs and shortages of required items.

Other reports suggest that the Center's food preferences frequently get questioned by Uncle Sam on Capitol Hill. Take the great fuss made a couple of years ago about the DoD buying

choice beef to feed troops<sup>8</sup> and a later critique that DoD wasn't getting its money's worth.<sup>9</sup> Since the shift from good to prime beef cost \$14 million and 65% of servicemen noticed no improvement in meat quality when served, it would seem that, although the motive of feeding troops the same quality of beef eaten by the majority of the American public may have been laudable, factors other than grade of meat (possibly due to the contractors and cooks) were influencing the eaters' preferences. Atmosphere, food preparation methods and quantity served were equally if not more important factors.<sup>2</sup> A later report showed that part of the problem was that the meat wasn't the choice beef it was paying for anyway,<sup>3</sup> so the DoD may have been cheated.

As a civilian, I was surprised to note that the Defense Department actually operates a complete system of everything from buying potatoes in Maine to operating commissaries.<sup>4,5</sup> In 1974, 279 commissaries in the USA existed with sales of \$2.2 billion and \$226 million in subsidies. In a sense, the commissary privilege is an ingrained custom and economic benefit, but the law is not clear on whether it is an intended fringe benefit for Military Service; and since many exist in urban areas where commercial outlets exist, clearly the original intent of providing a convenient means for servicemen at isolated stations to purchase food and necessities is not a justification. Also, it is odd that the various services differ in the percent of surcharge or markup which is levied.<sup>10,11</sup>

A second aspect of the structure of the Military which impacts upon program planning is that fitness is a mission-oriented objective. Indeed, it is part of the job of the Military. This attitude is one which is highly conducive to tie-ins with nutrition education and information.

Since I have little knowledge of the structural and organizational aspects of the Military which impact upon nutrition education programs other than the two I have mentioned, my remaining points are general suggestions which stem from these perceptions.

First, it might be helpful to stop thinking about military people as personnel when planning nutrition education programs. I think that "personnel" implies employees, staff or work force. "People" implies the notion of inhabitants, populace, or community. In order to accomplish the objectives we've talked about and to thus achieve the goals, the measures must be noncoercive and voluntary. The use of the term "personnel" might lead to the confusion that one can order people to eat a certain way just as one can direct an employee to work on a certain project. The word "people" emphasizes the notion that they are free agents who can do as they wish and that persuasion is most likely to be the means by which the goals can be achieved. By getting military people to be aware and prudent in their eating by educational and persuasive means, they will become better personnel. But it is my understanding that in today's Military, where most eating is done in a free-living environment, the individual himself or herself must be motivated to see to his nutritional health — and coercive measures are not employed.

Second, since a good deal of eating is done within military installations, the entire food environment must be thought of, not only educational messages. Fortunately, the more unpleasant aspects of the mess which were such common complaints of servicemen 50 or 100

years ago, are a thing of the past. A good deal of the credit for this goes to the dietitians in the Armed Forces.

Third, even though the Military is a separate institution, since many of the nutrition education needs of military people are the same as those in the general population, it only makes sense to draw upon and borrow from the other Federal Agencies with more money and manpower for producing nutrition education materials. USDA or HEW produce a great deal of material in these areas, some of which can be used as is, others which require adoption. But my point here is simply to look around and see what is already available before developing a brand new program. The looking takes time, but it is worth the effort since an enormous amount of the work may be already done.

Fourth, involve voluntary, professional and academic societies in helping to solve the special problems of nutrition education in the Military. These groups may need to be briefed since they may not understand the special needs you are well aware of, but they can be used more fully than they are at present!

Fifth, remember that in the next few years the Military, like the country as a whole, is likely to be getting older. Planning and education for nutritional health after 35 or 40 must be done now to face these people's needs.

Sixth, concentrate upon social marketing techniques for getting across the messages of fitness, weight control, and moderation in other respects. That is, use mass media techniques and "point of purchase" or eating marketing efforts to sell the idea of good nutrition.

Seventh, in order to achieve your objectives more fully it would seem to me that you have a great deal of resources here in DoD which might be drawn on for help -- DODDS, Trinius, the Uniformed Services University of Health Sciences and training programs for those who prepare food.

Eighth, keep your eyes on several new upcoming events which may necessitate changes in the future. These include new federal guidelines on diet (the 1979 RDA's and the American Institute of Nutrition's comments on the dietary goals). Changes in recipe files, meals and types of service in various DoD installations will be necessary to keep up with lifestyle alterations in food and eating for your people. Building in more environmental and food choices is probably going to be a necessity in order to accommodate.

Ninth, in my view, DoD needs to think about developing an eating guide for military people, which appeals to getting enough, not getting too much, new lifestyles, and the special needs of the military person. The emphasis shouldn't be on one set way of eating but on pros, cons, options, and free choice.

I'm very much aware of all of the progress in the right directions which has already been made toward accomplishing these goals. These include the Air Force's physical fitness and weight control programs, those of the other Armed Services, the HEART program of the Air Force, USAF's health education programs, conferences like this one, and SLIM and other adoptions to special needs and food habits in feeding facilities. More power to you. On

some of these points, you may find that activities of private sector groups along the same lines might be helpful to keep informed about.

#### **What Educational Programs Are Likely to Attain These Goals and Objectives?**

Many of the programs which have been discussed in the past few days would seem to me to be worth incorporating for the Armed Services, since they are very much in line with your objectives as I see them, and all stress one or more of the basics of nutrition. I would not presume to suggest which would best be tackled first, nor how they might best be integrated into your particular institutions.

#### **How can We Assess Whether These Goals and Objectives Are Met?**

The evaluation process is, of course, crucial in assessing if goals have been met. The useful evaluation kit put together by SAGE recently is a resource all of us should be more aware of than we are.

#### **Conclusion**

In summary, the Armed Services are to be particularly commended for their vigorous approach to fitness over the past few years. Now that other aspects of nutrition education are coming to the fore, it is to be hoped that plans, and programmatic realities, are equally fruitful.

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## EDUCATING CHILDREN TO EDUCATE THEIR PARENTS IN NUTRITION

Helen A. Guthrie

The increasing interest on the part of the public in the relationship of nutrition to health, has been accompanied by an increasing concern on the part of educators and nutritionists that children be given the knowledge and skills to allow them to function as nutritionally-literate decision makers. As a result, educators and nutritionists have begun to work together to identify the concepts that should be taught, and to develop alternative approaches to introducing these concepts in the school curriculum, and to prepare teachers to handle the material with confidence and enthusiasm. The ultimate goal of any nutrition education program is to motivate appropriate food choice behaviors.

One of the messages that has emerged over and over again in today's discussions is that considerations about nutrition are really not very potent in determining food choices. Apparently, taste, flavor, and some of the special meanings that foods have for us are more influential than what we know or think about nutrition. Those of us in nutrition education hope that we may be able to change that situation. Although we don't expect nutritional considerations to totally replace those other factors, we do hold some hope that they may become equally important in determining food selection.

Some of us question whether children influence their parents. If we look at all the recent concern about the impact of television on children, we have to agree that there is a segment of the population including many educators that feel that children do influence their parents. However, regardless of whether the pressure comes from the child or is solely the decision of the parent, in food choices the parents are the gatekeepers. They are the ones with the money who make the ultimate choice in purchases for use both inside and outside the home. They have the option of responding or not responding to the children's pressures. As nutrition educators we hope to influence the children to exert positive pressure on the family food choices.

For the past four years, we at Penn State have been involved in implementing a grant from the Nutrition Foundation. We have had the rather awesome charge of developing a comprehensive nutrition education program for the State of Pennsylvania. In this effort, we have been concerned with nutrition education for the general college student, for the general public, for health professionals, and for teachers and students.<sup>1</sup> Today I will confine my observations to our efforts in the area of teacher and student education in the elementary school system. Historically, we've done very little in the area of nutrition education, primarily because of a lack of resources. We've spent a considerable amount of time brainstorming about how our nutrition education efforts would have maximal impact. We've considered that children are still developing food habits. Thus, they will have a lifetime benefit from whatever is communicated.

We've talked about pregnant women because of their high motivation to make intelligent nutritional choices. We've talked about parents because they influence the next generation. The importance of the last factor is illustrated by an example. Last week at a meeting concerned

with the various factors that contribute to birth defects, there was discussion of the role of nutrition — particularly the effects of pre-pregnancy nutritional status. If 12 years ago we had decided to direct our attention to the elementary school child, we would by now have reached at least 20% of the parents of 1979. Perhaps, we would also have lowered the incidence of birth defects. By the same token, if we get busy now, we can influence the nutritional status of the mothers of 1992. Perhaps, rather than spending our time deciding what is the most effective place to start, we should get on with the job of injecting nutrition information to all segments of the population.

In addition to debating about what is the most appropriate target group, we have raised questions such as — Do you communicate information formally in the classroom? Do you communicate it informally with the media at the point of purchase? Do you use pamphlets? Do you use television? The most appropriate answer to these questions is all of the above.

Previous efforts in nutrition education in the schools have been relatively fragmented, suffering from a lack of resources and administrative support. By and large, there has not been much attention directed to preparing teachers to use available materials. Many times, nutritionists have failed to collaborate with educators in developing materials, and as a result the impact has been minimal.

The situation has changed in the last couple of years with the passage of an amendment to the child nutrition act. Each state presenting an acceptable plan is now provided with 50¢ per child per year for nutrition education in the schools.<sup>2</sup> In Pennsylvania this amounts to 1.3 million dollars a year, but this amount has been reduced to 29¢ per child in 1981. While this is likely 1.29 million more than we've ever had before, it's also only a drop in the bucket. However, this has presented a real challenge for getting nutrition at least introduced into school curriculums. Pennsylvania had somewhat of a head start having had this 4-year mandate from the Nutrition Foundation. During that time, we learned a great deal about factors influencing the success of such a program in the school system. One extremely important element is that there must be administrative support. The teachers are extremely responsive to the feelings of their administrators. They don't want to do something unless their efforts will be rewarded. They certainly are reluctant to be involved if they are going to be chastised for taking time from some other mandated aspect of the curriculum in order to follow their convictions and teach nutrition. The higher the administrative support, the better. The support of the State Board of Education will do much to encourage the local administrators and supervisory personnel. As far as the teacher is concerned, it is her school principal or superintendent that is extremely important. They are the individuals who must communicate to the teacher that they are encouraging activities in nutrition education. It is the administrators who must build a reward system. We found that it doesn't do much good to have only one committed teacher in a school. There must be a critical mass of professionals. Teachers, the school nurse, the school food supervisor, and, preferably again, the principal must be involved. Another experimental model suggests that getting some key teachers involved in the hopes that they will go back and encourage others has some impact.

If nutrition is going to be presented effectively, teachers must have a curriculum from which to work. It needs to be a sequential curriculum that builds throughout the school

years. Since it's unrealistic to think of introducing nutrition as a separate subject, **nutrition must be integrated** with language, art, health, science, mathematics, or wherever it may be appropriate.

Fortunately, there exist several methods for accomplishing this. The Dairy Council on the advice of a Blue Ribbon committee of nutritionists and educators has over the past few years developed some extensive curricular materials that they distribute to school districts at no cost.<sup>3</sup> They do, however, require that the school allow them to spend half a day teaching the teacher how to use it. Their approach has been built around their existing visual materials. The University of Hawaii is well into the development of a curriculum determined by talking to parents to find out what kind of food related activities they want their children to know about. It is definitely a food-based curriculum directed toward activities in the kitchen, on the beach, in the garden and in the market. It will be interesting to see the relative effectiveness of this food-based approach compared to the more traditional one of teaching nutrition concepts.

In developing our curriculum **Nutrition in the Changing World** we have a goal of producing a nutritionally literate high school graduate with a sufficient knowledge base to cope with the nutrition decisions that they will be making in 1990 to 1995.<sup>4</sup> In other words, we are concerned with teaching principles which hold, even though the marketplace may change considerably during that period of time. As a basis for the curriculum, we identified a list of 87 learner objectives appropriate for the whole K-12 curriculum. This was refined down to 40 and then submitted to 1000 members of the Society for Nutrition Education for their reactions. They were also asked to establish priorities among these objectives. Those 40 objectives were then used by educators as a basis for the curriculum.<sup>5</sup> After almost 4 years of developing and testing, a team of educators and nutritionists developed a sequential curriculum for kindergarten through grade six involving many subject matter areas such as language arts, mathematics, health and social studies. In addition, the curriculum was geared to teach the teachers how to access the variety of available resources. Sufficient nutrition information that a teacher could handle without having had any formal training in nutrition was included in each lesson.

Extensive testing showed that teachers really aren't as eager to teach nutrition as we might hope. Teachers are extremely legalistic and want to be sure that it is within the terms of their contract either to teach nutrition or take an in-service course. With the closing of many schools and decreasing enrollments, there are many experienced teachers in the school system who no longer need a certain number of credits for permanent certification. Thus, there was less motivation than we had anticipated for teachers to prepare themselves to handle nutrition. In addition, since the curriculum involves some food experiences, the cost of food, even at five or ten dollars a classroom, cannot be overlooked.

In field testing of the curriculum, it's been relatively easy to measure cognitive gain and to demonstrate that children whose teachers have used the materials know more at the end of 18 weeks than they did before they started. But that's really not the bottom line. What we want to know is, **Do these lessons make any difference as to what goes into the child's stomach?** What we want to try to measure is the effect of the curriculum on the food choice behavior of the children. We plan to look at lunchroom behavior in spite of the fact that

there are many variables impinging on the selection of food in the lunchroom. The cost of food, the quality of food, the attitude of people who are serving, the social and physical environment in which it is served, the time you have for a meal, and many other almost intangible factors work against behavior change.

Teacher attitude is a critical factor. Some of our evaluations have shown that the illusive factor accounting for differences from one classroom to another was largely attributable to the teachers' attitudes. Those who teach nutrition without any personal conviction of its importance have little impact on what the children learn. In addition, the teacher does need a sufficient level of knowledge of nutrition so that he/she feels comfortable with the concepts that are being taught.

Since many teachers are not comfortable in teaching nutrition concepts, we have two alternatives. There is in-service preparation for teachers already in the system, or we can try to encourage pre-service training for those who are still in schools of education. Mandating either type of program is hazardous. As soon as you do that without an established mechanism to prepare the teachers and without somebody in every State Teachers College who is capable of teaching the teachers, there is the ever present danger that pseudo-professionals and opportunists will take over the training. Thus, it appears that we would be better to start out by encouraging nutrition as a component of the preparation of teachers rather than mandating it. There is always the contention that the curriculum is already too crowded and there is no space for any other subjects. But that is no reason to admit defeat.

We need to try to find some ways of making nutrition education possible. Aspects of nutrition education in the schools that should not be overlooked are the subtle nutrition messages in other textbooks used in the school system. If you look at these carefully, you will find that there are a lot of counter nutrition messages which are appearing in the social studies units, or in the language arts books. There are stories in which the good guy is rewarded by sitting down and eating all he possibly can until he falls asleep. In the math problems children are often asked to determine how many candy bars they can buy for 25¢ rather than how many apples or bananas. All these illustrations tend to emphasize the foods other than the ones that the teacher may be emphasizing in the nutrition lessons. We do have the resources to get nutrition to the youngster at a time when food habits are still in a formative stage. As yet, we don't have a very effective mechanism for preparing the teachers to teach. At this point the lack of committed and prepared teachers is the weakest link in the nutrition education chain. Since effective education is dependent on competent teachers, at the same time we are funding nutrition in the classroom, we must be supporting nutrition in the teacher colleges.

On the foreign bases where there are military-sponsored schools, you have a golden opportunity to build in a reward system for the teachers and to encourage the teaching of nutrition. Any program should look to the availability of supporting take-home materials for the children. Ultimately, we would like to think of having supporting programs for parents and the community such as using the media to present nutrition programs for community groups and parent-teacher organizations.

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## SERVICEPERSON TO VETERAN:

### IMPLICATIONS FOR NUTRITION AND PHYSICAL FITNESS PROGRAMS

Edwina L. McDonald

When I was invited to participate in this program, it was requested that I provide you with a brief description of the veteran population we treat in our Veterans Administrations' Medical Centers and of our nutrition programs — the ultimate intent being that if the military establishment could make a concerted effort to reduce the prevalence of nutritionally associated illnesses of our veterans, the VA would not have as much business.

After listening the past two days to the problems you are encountering in the Military in health care and, specifically, nutrition education, I do not see the VA losing any business — not because I don't see the Military succeeding in its nutrition goals. To the contrary, I see potential for the Military to make a tremendous contribution to the nutritional health of the nation by the impact you can make on servicepersons while they are in your hands.

It was mentioned several times that to be effective, nutrition education has to be individualized, rewarded and reinforced. I can see the Military doing an excellent job with men and women between 18 and 45, and I see the VA as a part of a nutrition education continuum. Hopefully, the VA responsibility will someday be that of reinforcing the nutrition principles learned in the Military and adapting these to meet the current needs of the age groups we will be serving.

At this time there are nearly 26.5 million living veterans. These veterans represent all wars, and, therefore, many age groups.

TABLE 1

#### Average Age (yrs) of Veteran Population

Vietnam Era	30.7
Korean Conflict	46.9
World War II	58.2
World War I	83.0
Spanish-American War	98.0

The average age of all veterans in civilian life is 47 years of age, and the average age of veterans who received treatment in VA Medical Centers is 54.2. We do not identify our veteran patients by the branch of the Military Service to which they belonged.

The diagnostic characteristics of patients treated in VA Medical Centers differ from community hospitals in the high percentage of patients with alcoholism or cancer. There were over one million episodes of inpatient hospital care in VA hospitals in FY78. These are among the principal diagnoses for 942,070 patients at the time of discharge:

TABLE 2

Principal Diagnoses of Veterans Treated in VA Medical Centers

23%	Mental Disorders
	40% Alcoholism
	5% Drug dependence
15%	Diseases of the circulatory system, including hypertension, heart disease, and arteriosclerosis
10%	Neoplasms
9%	Diseases of the digestive system, including ulcers, intestinal, liver, gall bladder and pancreatic diseases
7%	Diseases of the respiratory system
5%	Diseases of the nervous system and sensory organs, including paraplegia and quadriplegia
5%	Diseases of the genitourinary system
4%	Diseases of the musculoskeletal system, including arthritis and osteomyelitis
3%	Endocrine, nutritional, and metabolic diseases
	74% Diabetes Mellitus
	10% Diseases of the thyroid and other endocrine glands
	9% Other metabolic diseases
	4% Obesity not of endocrine origin
	3% Avitaminosis and other nutritional deficiency
1.5%	Infective and parasitic diseases, including tuberculosis and infectious hepatitis
0.5%	Diseases of blood and blood forming organs

This does not list 100% of all principal diagnoses, but rather those with an identifiable nutrition component in their treatment. (Not tabulated in this list were diseases of the skin, symptoms and ill-defined conditions, accidents and poisonings, etc.) As I mentioned earlier, the average age of the hospitalized veteran is 54.2 years.

TABLE 3

Principal Diagnoses\* for Veteran Patients  
Whose Average Age is Under 40

	Average Age
Infectious hepatitis	35.0
Psychoses associated with drug dependence	28.3
Drug dependence	31.4

\*Selected from diagnoses listed in Table 2.



Another pertinent characteristic for this large population of discharged patients is that only 54% are married. The remaining 46% are identified as never married, widowed, divorced, or separated. Clinical Dietitians find this significant in their work in that it is the patient, primarily male, and not the caregiver in this 46% who must learn much more than the restrictions of his diet. Meal planning, food budgeting, food purchasing, and food preparation are essential in diet counseling for these patients.

Congressional legislation specifies that all veteran health care is to be therapeutic and/or rehabilitative but does not authorize preventive health care. Therefore, VA Dietitians are not permitted to provide nutrition education in either the inpatient or the ambulatory care settings for the primary purpose of preventive health care. The therapeutic role of nutrition in many illnesses is well established. Moreover, the importance of maintaining or restoring normal nutrition to help a patient cope with trauma and to respond to the treatment regimen is becoming better documented, particularly since the advent of total parenteral nutrition and an increasing awareness of malnutrition in hospitalized patients.

TABLE 4

VA Health Care Facilities

Medical Centers	Number
Health Care Components	172
Domiciliaries	15
Nursing Home Care Units	91
Independent Domiciliary	1
Independent or Satellite Outpatient Clinics	45

Our hospitals range in size from about 80 beds to over 1300. One hundred thirty-six hospitals and 38 outpatient clinics are affiliated with 104 medical schools, and all conduct some training of students in one or more of the health care professions. VA hospitals have a positive attitude toward education programs, but vary considerably in degree of sophistication and expertise in teaching.

There are 1131 dietitians employed in the 172 VA Medical Centers, Domiciliaries and Clinics across the country. About 70% of these are assigned to the clinical dietetics program. The physician's diet order in the patient's medical record authorizes the dietitian to initiate nutritional care, from nutritional assessment upon admission through nutrition education at the time of a patient's discharge. The majority of VA Clinical Dietitians in general medical hospitals have a caseload of over 100 patients each. In neuropsychiatric hospitals a Clinical Dietitian is responsible for over 200 patients. It is becoming readily apparent that there is a need for supportive personnel, specifically, qualified dietetic technicians, to enable the Clinical Dietitians to function at the appropriate level of professional competency and to provide the appropriate amount and kind of nutritional care for each patient.

Clinical Dietitians see nutrition education as one of their primary functions. In the VA setting this means that the Clinical Dietitian holds himself/herself responsible for instructing

patients and their caregivers on the essentials of their prescribed diet and of individualizing this diet to the patient's lifestyle prior to discharge from the hospital. Ambulatory patients are often educated on the fundamentals of their diets in group classes held in our hospitals' Nutrition Clinics or in conference rooms in the patient care units. Some of our hospitals have food demonstration units which teach patients how to prepare their own food. The Clinical Dietitian will also coordinate nutrition education with the instruction given by other health care professionals. Patients who are confined to bed are instructed on their diets on a one-to-one basis. Some Clinical Dietitians have developed self-instruction modules, such as slide and audiotape or booklet and audiotape presentations. These are used to convey basics of normal nutrition or modified diets. They are designed to stimulate patients' interest and questions about their diets before individual counseling occurs.

The Clinical Dietitian is frequently a participant in a multidisciplinary team teaching in selected patient care modalities. The dietitian, nurse, social worker, and sometimes the physician, discuss with the patient different facets of health care, sometimes on a one-to-one basis, and sometimes in a group. Hypertension, diabetes mellitus, obesity, alcohol and/or drug dependency and cardiac rehabilitation are among the illnesses with which the team approach is used in patient education programs, and in which the dietitian is an active participant.

The degree of success Clinical Dietitians have had in educating patients and motivating them to comply with normal nutrition guidelines and modified diet restrictions has not been well documented. From one VA hospital to another, Clinical Dietitians report different educational techniques are effective for them. When behavior modification came into the limelight, some dietitians worked with Clinical Psychologists to learn this therapy. Obesity clinics employing this technique were established. Some Clinical Dietitians have told me that they have used behavior modification with other than obese patients to help them comply with their prescribed diets.

Qualified dietetic technicians are employed in some VA medical centers. Clinical Dietitians have found that these technicians are able to do a creditable job of teaching the fundamentals of nutrition and modified diets to veterans. These technicians possess an Associate in Arts degree with a nutritional care emphasis. They are trained to interview patients for selected information, read medical records to collect specified data, record intakes, and provide basic diet instruction. Sometimes dietetic technicians have the advantage of readily establishing rapport with patients because they may be better able to discuss nutrition at the patient's level of comprehension. They use less technical nutrition terminology and discuss the diet fundamentals within the patient's own frame of reference. Having dietetic technicians on the staff makes it possible for Clinical Dietitians to spend more time with complex nutrition problems and to communicate with other health professionals verbally or in writing in the patient's medical record about the total nutritional care process.

Improved documentation in medical records, more active participation in ward rounds with physicians and other disciplines, and attendance at patient planning conferences have given Clinical Dietitians greater visibility. In some instances this has helped to increase the physician's awareness of the importance of nutrition in the total treatment program. Clinical Dietitians are often asked to conduct nutrition education classes for residents and medical students in our affiliated hospitals. In some cases, this nutrition education is conducted for groups, but

are represented on this Committee. The work of this Committee is of growing importance because patient education is identified in patient care audits, because patient educators are being held accountable for this responsibility, and because patient education is required in the standards used to assess patient care by VA health care evaluators and by Joint Commission on Accreditation of Hospitals surveyors. It is through Patient Education Committees that multidisciplinary patient education modules are developed for inpatients and in ambulatory care.

Next I should like to tell you about VA Patient Health Education Coordinators. At the VA a coordinator is responsible for overall planning, organizing, and directing of patient health education for an entire Medical District. A Medical District is a geographic designation for one or usually several states, depending upon the total veteran population and number of VA hospitals located within them. A coordinator must have a minimum qualification of a Master of Public Health Degree in health education and two years of experience in the field. They function on a Medical District-wide basis. They plan programs that may be coordinated among hospitals in the Medical District, advise on educational approaches, serve as consultants to professional staff and provide in-service education to improve staff competency in patient education. They test patient education for outcome rather than progress, the goal being to ensure that the patient knows all he needs to know about his own care and changes his behavior accordingly. These Patient Health Education Coordinators have helped the professional staff to understand the concept of making the patient an informed participant in his own care. Placing responsibility on the patient and assuming the role of a change agent has imposed on health educators the need to learn new knowledge and skills, dietitians being no exception. Therefore, Clinical Dietitians have found a need to add "improve education expertise" to their professional development plan.

This brings me to a third VA educational program. There are six VA Regional Medical Education Centers (RMEC) balanced geographically across the country. Each Center has responsibility for approximately 25 to 30 VA hospitals located within its regional boundary. The RMEC mission is to be responsive to the educational needs of professional staff in the assigned hospitals. An educational needs assessment is made annually of each VA hospital, and an educational schedule for the year is planned accordingly. For example, the Dietetic Service at many VA hospitals requested more in-depth education in nutritional assessment. All but the one RMEC which opened recently have conducted Nutrition Assessment workshops. In some RMEC's there have been follow-up seminars on implementation of nutritional assessment procedures. In addition, the RMEC's have provided other nutrition education programs such as refresher workshops in the Biochemistry of Nutrition and the Team Approach to Nutrition Assessment. The latter is an example of the physician, nurse, and dietitian being educated together in nutritional care. Three-person teams were sent to this program from 26 VA hospitals. This will give you some idea of our potential in VA for nutrition education of veteran patients and for staff development of professionals providing this education.

From what I have heard during the past two days, I think that there are common goals in nutrition education of service persons and of veterans.

1. We all want the outcome of our efforts to be well nourished, healthy persons, who are educated to maintain optimum health.

2. We are all seeking the best way to integrate nutrition education into the lives of our clientele. We have much to learn, however, about where nutrition education should most appropriately take place. One of the conferees emphasized that dietitians often don't have sufficient space to ensure the privacy and environment needed by patients and caregivers for learning to take place. Also, what is the best timing for nutrition education?
3. How can we all do a better job in nutrition education? What are the best teaching techniques to use in given circumstances? Who can and should be doing the teaching? We must effectively use professional staff and their technical expertise and train supportive personnel to meet the patient's and serviceperson's educational needs. We need help in being better evaluators — of our veteran's and serviceperson's needs, of ourselves as nutrition educators, and of our nutrition education programs.
4. Finally, we both need to learn how to make it happen, how to get servicepersons and veterans alike to assume more responsibility for their own nutritional health. Instead of our doing something to them, they have to do something for themselves.

It appears to me that with so many common interests and needs, we have much to learn together and much to share.

## **NUTRITION EDUCATION PROGRAM DEVELOPMENT: A RECOMMENDED DEVELOPMENT CYCLE AND ROLE FOR PROGRAM EVALUATORS**

**Michael J. Wargo**

Over the past two and one-half days, I have been dreading the thought that one or more of the 21 speakers that have preceded me might steal my thunder and leave me little new to say regarding the development of viable nutrition education programs for adults in the military environment. I am delighted to report that my fears were unfounded. I will in fact have an opportunity to focus my discussion in an area untouched by previous speakers yet key to the achievement of the objectives of this conference and to the military establishment in its seeking to improve nutrition education programs for military personnel and their dependents.

My basic message is threefold. First, I propose a model or ideal cycle for the development of viable nutrition education programs. Then, I suggest and define a role for trained and experienced program evaluators throughout the developmental process associated with the production of cost-effective nutrition education programs. Finally, I suggest that the proposed model for the development of nutrition education programs and the recommended role for program evaluators in that development process are both essential to the production of effective and efficient nutrition education programs.

Figure 1 summarizes what I consider to be an ideal or model development cycle for nutrition education program design and implementation. The recommended development cycle

### **STAGES OF DEVELOPMENT**

**STAGE 1: TARGET POPULATION SPECIFICATION AND NEEDS ASSESSMENT**

**STAGE 2: PROGRAM OBJECTIVE SPECIFICATION**

**STAGE 3: DEVELOPMENT OF PROGRAM STRATEGIES/MODELS/CURRICULA**

**STAGE 4: PRELIMINARY PROGRAM PACKAGING**

**STAGE 5: PILOT TESTING**

**STAGE 6: MODEL REVISION AND PACKAGING FOR REPLICABILITY TESTING**

**STAGE 7: DEMONSTRATION (REPLICABILITY TESTING)**

**STAGE 8: MODIFICATION AND PACKAGING FOR WIDESPREAD IMPLEMENTATION**

**STAGE 9: WIDESPREAD IMPLEMENTATION AND PERIODIC ASSESSMENT**

**Figure 1. A Proposed Development Cycle for Nutrition  
Education Programs**

consists of nine stages each of which builds upon the products of preceding stages. The cycle starts with an assessment of the nutrition education needs of target populations and concludes with a full scale implementation and final assessment of program operations. Although sequenced, progression through the development cycle illustrated in Figure 1 is usually an iterative process. For example, needs assessment of the program's target population is addressed at the very beginning of the development cycle and is readdressed and refined during the objective specification, curriculum development, model revision, and packaging stages of development. My basis for recommending the nutrition education program development cycle illustrated in Figure 1 is my successful experience in its use and that of others who have employed a similar development model in military, educational, industrial and other settings.<sup>1,2,3,4</sup>

The following will discuss in some detail the objectives, methods, and products associated with each stage of the proposed development cycle for nutrition education programs. A role for program evaluators throughout the design process will also be specified and functions that should be performed by evaluators at each stage of the development process will be described. As suggested above, when the second thesis of this paper was described, I take the position that the contribution of the program evaluator can be maximized by his participation throughout the development process from initial assessment of target population needs through full-scale implementation and assessment of the nutrition education program. This combination of adherence to a model development cycle for nutrition education programs and to the early and sustained involvement of a trained and experienced evaluator is designed to ensure that the final products of the development process will be nutrition education programs that are tailored to their intended target populations and that are successful in achieving their goals in a cost-effective manner.

#### **STAGE 1: Target Population Specification and Needs Assessment**

As indicated in Figure 1, the first stage of the recommended process for development of nutrition education programs is entitled "Target population specification and needs assessment." The primary objective of Stage 1 of the development process is to **identify the target population** for the nutrition education program and to characterize that population in terms of its nutrition education needs and other variables that may be related to its educability. Target subpopulations that have unique needs or characteristics that may affect their educability or impact program design should also be identified during Stage 1 of the development process.

The methods used for target population specification and needs assessment run the spectrum from armchair speculation through identification, review, and synthesis of existing data to survey of potential target populations. The soundest information available regarding target population definition, description of its subgroups and their characteristics, and assessment of their needs should be sought during Stage 1 of the development process. Adherence to the above principle suggests that the initial step of Stage 1 should consist of an **identification of all existing information** relevant to the target population specification. Next, the **content and quality** of those data should be assessed and data **judged to be relevant** and of reasonable quality should be **synthesized**. The resultant synthesis should then be assessed to determine if significant information gaps are present. If so, additional data collection efforts should be

planned and conducted. New data should then be synthesized with extant data and the resultant data base should again be assessed as to its content sufficiency in terms of an adequate description of the target population, its subpopulations, their characteristics and needs. If this activity proves insufficient, a second or third data collection and synthesis with existing data may be necessary. Once the existing data base is judged to be sufficient for program development, the design team should progress to Stage 2 of the development process.

In many practical situations the above suggested method for target identification and needs assessment can be simplified because of the existence of sound data relevant to target population specification and needs assessment. In other situations there may be a dearth of extant data and limited funds available for new data collection. In the situation when the developers are both data and dollars poor, probably the only sound method available for target population identification and needs assessment is to rely on expert opinion. Should expert opinion be selected as the only practical method of target population identification and needs assessment, then extreme care should be taken in the selection of the experts for this activity. Experts should be selected who are aware of the major policies of the sponsoring organization, who are knowledgeable with regard to potential target population characteristics including their needs, and who have sufficient expertise to suggest criteria for prioritization of populations, subpopulations and their needs. Specialists in identifying target population characteristics, needs assessment, nutrition education, nutrition curriculum development, teaching and training, as well as representatives of potential target populations themselves should be included in the panel of experts.

Once formed, the panel of experts should develop and agree to a set of criteria that they will employ in developing recommendations regarding target population specification and description of population and subpopulation nutrition education needs. The primary goal for the panel of experts should be the development of a set of alternative definitions for target populations and subpopulations, as well as a detailed description of their nutrition education needs and other characteristics relevant to the design and operation of a nutrition education program. The products associated with the achievement of that goal should be sufficient for use by senior policymakers in selecting a target population and set of associated nutrition education-related needs.

Regardless of the methodology employed, the major product of Stage 1 should be a clear specification of the intended population for the planned nutrition education program. Important subpopulations should also be identified. The nutrition education needs common to the target population as a whole should be detailed as well as those needs unique to subpopulations. Characteristics of the target population and its subgroups that may affect the design, operation, and success of the program should also be included among the Stage 1 products. All of the products of Stage 1 should be documented in clear, simple and jargon-free language since those products will guide specialists from various disciplines and walks of life throughout the design, development and assessment process.

The target population specification and needs assessment activity associated with Stage 1 of the recommended development cycle will have a profound effect on the remainder of the program development process. The final products of the development cycle will ultimately be tailored to the needs of target population and subpopulations specified in Stage 1.

Populations or subgroups not included in the early specification or needs not addressed in that assessment will be outside of the scope of the developed program and consequently will not be addressed by the program's curriculum. In short, Stage 1 focuses the development process on particular groups, their specific needs, and their unique characteristics that may have a bearing on curriculum design; format, presentation and other aspects of program operations.

The time and effort expended during target population identification and needs assessment will have direct and cumulative impact throughout the remainder of the design process. Consequently, a level of effort and of methodological sophistication is recommended during Stage 1 that is commensurate with the importance of providing nutrition education to the defined target population. A shortchanging of Stage 1 can significantly contribute to the ultimate failure of the developed program.

The success of any nutrition education program development effort that follows the recommended development cycle is dependent on the **timing, type, and level of participation** provided by trained and experienced program evaluators. My position on the timing of such involvement should be clear at this point — the sooner the evaluator gets involved in the development process the better. In terms of role, the following section will discuss a recommended role and associated functions for evaluators during Stage 1 of the nutrition education program development cycle. Later sections will focus on evaluator participation throughout the remainder of the design and assessment process.

A trained and experienced evaluator should assist the development team in focusing its proposed nutrition education program on a target population that can be impacted within the constraints of time and dollars. The evaluator should facilitate selection of a realistic **population** for the program, one that has some reasonable likelihood of being served and **impacted in a positive fashion** within limitations on development and operational costs.

The evaluator should also assist the design team in identifying unique subpopulations of the target population. Subpopulations of interest are those that are defined by characteristics that may have an impact on their educability and/or curriculum and program design. Examples of relevant subpopulations include those with unique nutrition or health status, education levels or deficiencies, food attitudes, consumption patterns, or those from non-mainstream heritages. The critical aspect of subpopulation definition is that the characteristics used to differentiate the subpopulations from the general target population should be relevant in some meaningful way to the design and operations of the nutrition education program.

Once the target population and its subpopulations are specified, the evaluator can assist the design team in identifying the nutritional education needs of the targeted groups. Areas where the target group or subgroups may have deficiencies in their nutrition and health status, or may deviate from the desired knowledge, attitudes and behavior should be documented. The evaluator should assist in producing need documentation that clearly specifies each type of nutrition education need and the severity of each need by target population subgroup.



Another way that the program evaluator should assist the nutrition education program development team is in the design of criteria by which target populations, subpopulations and their needs can be prioritized. Stage 1 activities often result in the identification of several potential target populations and/or subpopulations, each with somewhat unique needs. Development of criteria to prioritize potential target populations and subpopulations will assist in the later selection of the specific populations that will become the primary focus for all further program development. Similarly, criteria developed to select specific needs for focus of the nutrition education program will also greatly facilitate the design process. In sum, it is the view of the author that the program evaluator's analytic skills should be brought to bear on the nutrition education program development process at the very earliest stage of the process and his participation should continue throughout the remainder of the design and assessment activity.

## **STAGE 2: Program Objective Specification**

The second stage of the recommended nutrition education program development process focuses on the specification of the program's objectives. The objectives or goals selected for the nutrition education program should define exactly what the program is intended to accomplish. The program's objectives should describe the specific target populations and subpopulations for the program, the needs of those populations that will be addressed by the program, and the intended impacts of the program on the served populations. If the program has more than one target population and/or is focused on more than one need of one or more target group(s), then the objectives of the program should reflect the priority of served populations and the priority of the program in meeting various target population needs. The final set of program objectives should unambiguously guide the development process and serve as criteria for assessment of program effectiveness.

Much of the methodological armament that policy analysts,<sup>5</sup> systems analysts,<sup>6</sup> operations researchers,<sup>7</sup> educators,<sup>8</sup> and program evaluators use to develop objectives is applicable to the development of objectives for nutrition education programs.<sup>9</sup> In general, those disciplines recommend, and their methods are designed to ensure that objectives are stated in clear and concise language, that objectives describe the focus of the program activities (for example, target populations and their needs) and that intended impacts are specified in measurable terms. The selected set of objectives for any nutrition education program should clearly prioritize the program's target populations and should specify the priority placed on meeting specific population needs. Finally, regardless of the discipline of origin or methodological rigor used, most of the analytical techniques used to specify program goals will also produce objectives that can usefully guide the program's design, development, and assessment process.

The major product of Stage 2 of the recommended development process is a set of prioritized objectives. Each objective in the set specifies a target population or subpopulation, their needs and anticipated program impacts on served groups. Objectives are prioritized on the basis of information on target population characteristics produced during Stage 1, knowledge of current sponsoring organization goals, and existing constraints summarized during Stage 2. The prioritized set of objectives, the product of Stage 2, should guide the entire development of the nutrition education program and should serve as a basis by which the resultant program will be judged successful or unsuccessful.

One major contribution that the program evaluator can make during the objective specification process is to assist the developer in defining the target population and specific needs of those target populations that will be the focus of intervention. The evaluator should facilitate the development of objectives that are targeted at priority needs of priority target groups within existing constraints. The evaluator's skills are useful in selecting those needs that can realistically be met by interventions that are within the state-of-the-art of nutrition education as well as within time and dollar constraints for development and operations. Evaluators should also be useful in ensuring that the impacts described by objectives are possible and that they are described in terms that will facilitate program assessment — in measurable terms. Finally, the program evaluator's analytic skills should be useful in assigning priorities among the various objectives selected for the program.

### **STAGE 3: Development of Program Strategies/Models/Curricula**

The primary objective of Stage 3 of the nutrition education program development cycle is to select or develop a method of nutrition education that has a high probability of achieving program objectives within the practical constraints of existing time and dollars. The selection or development of such a method requires analysis of the characteristics of the target populations that will be served, their needs, the environment and specific context within which the program must operate, available resources, service delivery systems, available and needed staff, and desired impacts as well as program development and operation costs. Analysis of those factors should guide a review of existing strategies, models and curricula that might be applicable to design of the program. Should the designer find that existing programs or modifications thereof are inappropriate for purposes of achieving desired program objectives, then he must either abandon his efforts or commit himself to the development of an entirely unique program. Fortunately, in most cases the designer will find that he can capitalize on existing technology and modify it to achieve his specific objectives.

The methods applicable to Stage 3 of the development process include techniques that facilitate review and analysis of existing nutrition education methods, strategies, curricula, models, and theories.<sup>10</sup> Standard curriculum development methods are applicable especially in the case where major modification of an existing method is necessary or when a curriculum must be developed from scratch.<sup>11</sup> Methods associated with systems analysis and operations research such as trade-off analyses, cost assessment, and cost-effectiveness analysis should also be useful in attempting to select or develop a method for nutrition education that will achieve selected goals within existing constraints.

The major product associated with Stage 3 is one or more methods for nutrition education that appear to have a high probability of achieving the objectives developed during Stage 2 of the development process. The selected or developed methods should be appropriate to the program's target population and the priority needs of that population, they should be operable in the expected range of program environments; and, they should show promise in meeting the target population's needs and program objectives within available resources.

Nutritionists and instructional program developers play the lead role during Stage 3 of the development process. The program evaluator can, however, make a significant contribution

to development during Stage 3 by assisting instructional program developers through the various steps of the process that leads to the selection, modification, or development of a nutrition education program designed to achieve all desired program objectives. The evaluator's skill, knowledge and experience should assist the instructional program developer during his review of existing methods and models for nutrition education; when he is involved in developing and applying criteria for selection of viable strategies, models, curricula; and, when he is developing final specifications for the selected curriculum.

#### **STAGE 4: Preliminary Program Packaging**

The fourth stage of nutrition education program development has two major objectives. The first objective focuses on the design and development process and the second deals with the program assessment process. The first and primary objective of Stage 4 is to develop the materials, procedures curriculum, and instructions required to implement the selected program. The second objective of Stage 4 is to develop a plan for the assessment of the costs and effectiveness of the selected program after it has been implemented at a limited number of sites. The principal responsibility for achievement of the first objective is usually assigned to program developers whereas the second objective is usually the prime responsibility of the program evaluator. It is during Stage 4 that the evaluator begins to play a more critical role in the development process — a role that can more effectively be performed as a result of the evaluator's participation through the earlier stages of the development process.

The methods applicable to Stage 4 of the recommended development process vary with the particular objective addressed. The first or packaging objective can be achieved through use of standard instructional development methods and procedures. The second or evaluation objective can be most appropriately addressed through use of the techniques and methods usually associated with program evaluations and evaluation research.<sup>12</sup> The first set of techniques, those of instructional program development, have been addressed in numerous texts and will only be referenced here.<sup>13,14</sup> The second set of methods applicable at this stage of instructional program development, those deriving from program evaluation, will be discussed in some detail in later paragraphs when the role of the evaluator in Stage 4 is more fully discussed.

Stage 4 should result in the development of two products which correspond to the dual objectives of this stage of the design process. One product of Stage 4 is a model program that is ready for implementation and assessment at a limited number of sites. The second product is a plan, which includes instrumentation, for the assessment of the pilot program. The successful production of both products is necessary before the development process can progress to Stage 5, pilot testing. The evaluator's role during the preliminary packaging phase of program development is twofold. On the one hand, he assists in the packaging process and, on the other, he is responsible for planning the assessment of the pilot project.

The evaluator's role during program packaging is actually quite limited. His major responsibility is to serve as a team member uninvolved in the mechanics of packaging but deeply concerned with the product of the process. The evaluator should monitor the packaging process to ensure that the packaged program actually meets the design specification for the program. His participation helps ensure that the packaging process does not result in a program

that in any significant respect differs from what was desired prior to packaging. The evaluator assists in assuring the fidelity of the packaged program to program specifications.

The second role of the evaluator during Stage 4 directly relates to pilot program assessment. The evaluator has primary responsibility for development of a formative and summative evaluation plan that when implemented will result in a sound assessment of program costs and effectiveness. Formative evaluation is a type of evaluation that documents and assesses the program implementation process and provides immediate and ongoing feedback to the program implementer and developer for purposes of program improvement and fine tuning. Summative evaluation focuses more on assessment of overall program effectiveness or impact after a program is fully implemented and a reasonable period of time has elapsed for the program to have demonstrable impacts. During Stage 4 of the development process the evaluator is responsible for developing plans for both types of evaluation. In addition to evaluation plan design, the evaluator is generally responsible for the development of a monitoring plan for program implementation. Although similar to a formative evaluation plan, a monitoring plan is usually less technically sophisticated and is most often implemented by program personnel rather than evaluation staff. A monitoring plan consists of a set of tasks that are designed to achieve program goals, an expected timeline for task completion and objective achievement, and criteria for assessing program implementation progress and impacts. The plan is used by program personnel to monitor progress in program implementation and to assess initial program impacts.

The formative and summative evaluation plans developed by the program evaluator are similar in content although as mentioned above they are designed to achieve different ends. In general, they consist of a set of evaluation objectives, a sampling plan, a design for data collection, a set of data collection instruments, a data collection and reduction plan, a data analysis plan, and a report production and dissemination plan. Both plans also include criteria or standards that will be employed to assess the practical and statistical significance of various types and levels of program impact.

## **STAGE 5: Pilot Testing**

The major objective of the pilot testing phase of the nutrition education program development cycle is to assess the impacts of the program on student nutritional knowledge, attitudes, and behaviors. The pilot test is an attempt to determine if the program as packaged can be successfully implemented at a small number of sites that differ in several respects. The pilot test also attempts to assess program goal achievement and documents all intended or unintended program impacts. Pilot testing provides feedback to program developers for purposes of capitalizing on program strengths and eliminating program weaknesses.

The methods used during the pilot testing stage of program development include program monitoring, formative evaluation, and summative evaluation. Monitoring methodology is employed by program implementers primarily to ensure that the program is implemented as originally designed and along the desired timeline. Formative evaluation feedback is used by program designers to improve program operations and increase the probability of positive program impacts. In contrast, summative evaluation findings are used to assess the costs and

benefits of the program after it has been fully implemented and has had a reasonable period of time to impact the target population.

The major products of pilot testing include an assessment of the effectiveness and efficiency of pilot program operations, a documentation of program strengths and weaknesses, and a set of recommendations for program improvement. On the basis of those products the design team should determine whether it is feasible to continue through the design cycle or whether it will be necessary to go through iterations of the earlier stages of development in the hope that additional design and pilot testing will produce a better program.

Although the evaluator may assist in the implementation of monitoring plans, his role during pilot testing is primarily evaluative in nature. The evaluator is responsible for the implementation of both the formative and summative evaluation plans. Such implementation entails sampling, data collection, data reduction and analysis, report writing, and dissemination of results and recommendations. The evaluator's key responsibility in conducting these activities is to ensure that the results and recommendations are timely, useful, and understandable to program operators and designers. The results of both evaluations should have significant impact on the remaining design activities associated with the development of a viable program for widespread implementation.

#### **STAGE 6: Model Revision and Packaging for Replicability Testing**

Nutrition education program development proceeds to Stage 6 only when pilot testing indicates that the program has been or can be successfully implemented and has or can have positive impacts on the nutrition knowledge, attitudes, and behaviors of the target population. If the program was unsuccessfully implemented during pilot testing, then revision in design, packaging, or operations may be in order as well as a repeat of pilot testing. If the program was successfully implemented but had negative or few positive impacts, then revision or abandonment of the design is necessary. If the program was successfully implemented and had positive impacts during pilot testing but proved to be too costly for the size of the impacts, then efficiency analysis, redesign, and a second pilot testing are required. In these three instances the design team usually decides to return to earlier stages in the development process rather than to progress to model revision and packaging activities associated with Stage 6. Progression to Stage 6 is recommended only when there is evidence that the program can be successfully implemented and can result in desired impacts within the constraints of existing resources.

Several objectives are addressed during Stage 6, the first of which focuses on the revision of the developed nutrition education program based on the pilot test's findings, recommendations, and any other information relevant to program improvement. The second objective associated with Stage 6 is concerned with modification and packaging of the revised model so that it can be implemented across a range of program sites that are representative of the variations in site conditions under which the program is designed to operate. The second objective prepares the program for replicability testing across a representative sample of program operation sites. Stage 6's third objective is to develop a monitoring and evaluation plan for the replicability testing that is the focus of development Stage 7. Achievement of these three objectives should result in a packaged program ready for implementation and assessment across a wide range of program environments.

The methods applicable to Stage 6 are similar, in general, to those described for use during earlier stages of development; however, they vary with the specific objective addressed. Model revision should employ traditional instructional development and nutrition education methodology. Modification and packaging for widespread demonstration and assessment should be facilitated by the techniques associated with the field of instructional program packaging and dissemination. Development of monitoring and evaluation plans should be based upon the technologies associated with program evaluation. Although no new methods are used in Stage 6, the methods that are used are employed to achieve a rather specific end -- that of producing a nutrition education program for widespread dissemination and assessment.

Stage 6 activity should culminate in two major products. The first is a revised nutrition education program that is packaged for dissemination to, and implementation within, a wide range of program sites. All of the materials, instructions, and guidance necessary to implement the program are an integral part of the packaged program. A second product of this stage of development is a set of plans for monitoring and evaluating the revised and packaged program during Stage 7 of the development cycle.

The role of the evaluator during model revision and packaging for replication is similar to the role he played during Stage 4, preliminary program packaging. The evaluator should monitor the revision and packaging process to ensure that those activities do not result in a packaged program that significantly differs from program specifications. That is, the evaluator should assist the development team in producing a packaged program that is congruent with program objectives and curriculum specification.

The second role of the evaluator during Stage 6 is that of an evaluation specialist. He is responsible for the development of a monitoring, formative evaluation, and summative evaluation plan for the demonstration activity of Stage 7. The objective and content of those plans are similar to what was described in the Stage 4 discussion of that topic. The primary difference in the Stage 6 plans is that they must be implementable across a wide range of program contexts or environments. The Stage 6 summative evaluation plan also differs from the summative evaluation plan for Stage 5 pilot testing in that the Stage 6 plan should produce evaluation results that are generalizable to the entire range of program environments for which the program was designed. The pilot testing summative evaluation was not concerned with such broad generalizability of results.

#### **STAGE 7: Demonstration (Replicability Testing)**

Stage 7 of the development cycle focuses on demonstrating that the developed nutrition education program can be implemented across a wide range of program implementation sites and that positive impacts on the target population accrue from program participation at some or all sites. The Stage 5 pilot testing focused on demonstrating that the program could be successful under somewhat restricted and artificial conditions. Stage 6 assesses the implementability and effectiveness of the program across a wide range of naturally varying site conditions.

The methods employed during Stage 7 are similar to those used during pilot testing; however, in the case of demonstrations many more implementation sites are involved. The

three major methods used to achieve demonstration objectives are program monitoring, formative and summative evaluations. In most cases the monitoring plans and formative evaluation plan can be tailored to the conditions at each implementation site. The summative evaluation plan, however, must provide some comparable data across sites for aggregation and assessment of the generalizability of program costs and impacts. For a more detailed discussion of the development and implementation of monitoring and evaluation plans the reader is referred to the preliminary program packaging (Stage 4) and pilot testing (Stage 5) sections of this paper.

Stage 7 should result in a thorough documentation of program implementation and the impact that the nutrition education program had on participants. Overall program impacts should be described as well as those that are unique to particular sites. Strengths and weaknesses of local variations in implementation should be detailed and the impacts of those variations on program outputs should be documented. Finally, the demonstration should result in a set of recommendations for improving program operations, impact, and operational efficiency.

The evaluator's role during the demonstration stage of development is similar to the role he played during pilot testing. The evaluator should assist program personnel in implementing their monitoring plan. He is also responsible for formative and summative evaluation plan implementation and documentation of evaluation results. The major difference in the evaluator's role during the demonstration as opposed to pilot testing is that during replicability testing his attention and skills must be directed at a larger number of implementation sites. This need for evaluation expertise at several locations simultaneously usually requires the development of an evaluation team at each local site or one or more teams that are highly mobile.

#### **STAGE 8: Modification and Packaging for Widespread Implementation**

Stage 8 of the recommended development cycle focuses on modifying the demonstrated nutrition education program on the basis of what was learned during the replicability assessment of Stage 7. A second objective of Stage 8 is to package the modified program for full-scale operation at all program sites. The methods used to achieve those objectives are essentially the same nutrition education and instructional program development and dissemination methods that were employed during earlier stages of the development cycle (see methods discussions for Stages 3, 4, and 6). The major product of Stage 8 is a fully operational nutrition education program that is ready for full-scale implementation at all potential program sites.

The evaluator's role during Stage 8 is similar to the one he performed earlier during Stages 3, 4, and 6. He should monitor all program revisions and the packaging process to ensure that modifications and packaging activities result in a nutrition education program that will achieve desired objectives and one that contains all desired program characteristics as specified in the program design plan. In addition to his design monitoring functions, the evaluator is responsible for the development of a monitoring plan for the program implementation. He also has responsibility for development of two evaluation plans during Stage 8. The evaluator should develop formative evaluation guidelines that can be used at each implementation site. Those guidelines will help to ensure that each program implementation is completed efficiently. The second evaluation plan that the evaluator should develop during Stage 8 is a plan to periodically assess the impact and efficiency of the program.

The impact assessment plan should consist of two components. One component of the plan should be designed for use at each local implementation site for periodic self-evaluation of program costs and effectiveness. The second component of the assessment plan should focus on the periodic assessment of the program across a sample or all of the implementation sites. This second plan is designed to assess impacts across many sites and thereby provides information relating to widespread program impacts — at the State, regional, National, and servicewide levels.

## **STAGE 9: Widespread Implementation and Periodic Assessment**

The nutrition education program development cycle culminates in the widespread implementation of the developed program. The program initially designed, pretested, modified, demonstrated to be successful at a wide range of potential implementation sites, and packaged for dissemination is now ready for widespread implementation as an operational program. The primary objective of Stage 9 is to effect a smooth and efficient widespread implementation of the program. A secondary objective of this final stage in the development cycle is to implement the monitoring and evaluation plans developed during Stage 8.

The methods used to achieve Stage 9 objectives are similar to those used during the demonstration stage of the development cycle. The main difference between stages is that in Stage 9 many more sites are involved in program implementation. The design team's participation in implementation will be considerably limited because of the large number of implementations and consequently must be mediated through the use of instructions and guidelines provided in the program implementation package. Technical assistance may also be necessary when sites find that instructions provided are insufficient or inappropriate in their particular case.

Dissemination materials must also include the plans for local monitoring and formative evaluation as well as plans for impact evaluation across sites. A technical assistance network may also be required to provide technical expertise to local implementation sites when dissemination package materials are unclear.

The evaluator has three major functions during this final stage of development. First, he must assist local sites during their implementation of the monitoring and formative evaluation plans provided in the program dissemination materials. His second function during Stage 9 is to assist local sites in implementing their periodic impact assessment plans. The evaluator's third function during this final stage of development is to periodically implement the summative evaluation plan for the across site assessment of the efficiency and effectiveness of the program. The evaluator will be required to provide technical assistance to local sites regarding the local implementation of monitoring and evaluation plans. He in turn will require the assistance of local program personnel for implementation of the plan to periodically assess the efficiency and effectiveness of the program across a group of sites.

## **Concluding Remarks**

The preceding described a nine-stage cycle for the development of nutrition education programs. The specific objectives associated with each stage of the cycle were described,



methods for achievement of each stage's goals were discussed, and products associated with cycle stages were detailed. The use of trained and experienced program evaluators throughout the development process was recommended. Functions and roles for evaluators at each stage of the recommended development process were suggested. Finally, the paper suggests that use of the proposed model for nutrition education program development and assignment of an evaluator to perform the recommended roles and functions associated with each stage of development will result in the production of more cost-efficient and cost-effective nutrition education programs.

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## DISCUSSION

**Dwyer:** If I remember last year at the conference on Dietary Goals in the Military held at Natick Laboratories, one of the things the Government had too much of was butter and it gave it to the Army at a special price, so that for a while there was some question whether one could have margarine, and I guess that was resolved, after a bit of debate and civilized discussions. However, is it fair to use the Army, Navy, and Air Force as a dumping ground for unfortunate and sometimes ill-advised food production policies by the civilian sector?

**Gussow:** I do not think the situation is any better for the things that go on in school lunch programs. I think that one has to feel that government policies will be such that such ill-advised purchases no longer will be made for the support of one group or another.

**Unidentified:** How do you teach people to make intelligent selections?

**Gussow:** I would merely say that as an educator, I find the notion of teaching the people how to make an intelligent selection by a simple principle. I tell people to go around the edges of the supermarket which is where they put all the necessities. You are supposed to wander through the meat section in the back, fruit and vegetable sections are on one side. I can tell what to do in the perimeter and then only venture into the interior when there is something I have on my list. One of my students did a study. She had been on the radio for a number of years as a sort of teacher of nutrition in New York City, and she did a study of the questions she received from her audience over time. The single, largest category of questions was that about dairy products. People just couldn't make head nor tails out of this tremendous variety of things that turned up in the dairy case. For example, what is the difference between 2% low-fat milk, skim milk, and skim milk powder and all the different kinds of yogurts? Despite the fact that I'm just fascinated by nutrition and that I think most people are fascinated by food, I just don't think we're going to get the average consumer to spend the kind of mental energy that is required to learn enough nutrition to choose wisely from among all those products. I teach a consumer nutrition course. Somebody once said to me, "If you could tell people only one thing about reading labels in terms of choosing food wisely, what would it be?" I replied that if a product has 33-1/3% of all the required nutrients, avoid buying it. God doesn't work that way. Do you choose your own meals based on nutrients? Really? I don't. I have some general knowledge in my head. I don't mind giving consumers that kind of general knowledge. My general knowledge consists of saying to myself the less processing the better, provided it's not spoiled. I have no objection to freezing and canning; I prefer fresh produce and I grow a lot of vegetables but I don't think most people want to learn about 14 or 28 or 54 nutrients in order to choose a diet. I don't think anybody wants to go through the supermarket doing that. I don't! I'm a nutritionist and I'm interested!

**Unidentified:** We had a discussion recently between a number of programs about the poor success of educational campaigns on the wearing of seatbelts.

**Gussow:** We have not been successful in our seatbelt or anti-smoking campaigns; there's a big myth about that. The cigarette manufacturers are allowing Congress to disallow cigarette advertising, because, in fact, the T.V. commercials were successful, but we haven't been very successful in countering these commercials.

**Holder:** We don't operate in our health-related behavior in any systematic or particular cognitive style. We assume that there is some systematic style. I don't think that we can ever win the battle of inappropriate nutrition, stopping smoking, or wearing seatbelts, on an intellectual level. It just isn't going to work because we operate emotionally. For example, you shop and buy something because of the brand label rather than its nutritional contents.

**Gussow:** I will tell you how to get people of this country to wear seatbelts, and that is to have every macho hero on the television screen buckle up before he takes off after the criminal. You would have people buckling up in this country quicker than any other way.

**Unidentified:** Then what's the alternative to the approach that we're talking about if we recognize this non-cognitive, affectual component of our behavior?

**Gussow:** That's why I recommend that you do something in the dining hall. You have to change people's opportunity to eat differently while you are simultaneously convincing them that it can taste good, which it can. That is, that it will be healthier for them to eat that way but you also have to make it extremely easy for them to continue doing it. The whole food marketing distribution and availability problem in this country is very difficult. Outside — in many of the large cities, such as Washington, D.C. — you can walk down the street and buy a piece of fruit when you feel like snacking. That has probably changed snacking behavior more than all the lectures in the world.

**Brewer:** Dr. Dwyer, could you tell us about the Giant Foods' Program in consumer education? I was wondering if there was any difficulty with any questions on this that come up when someone suggests that we go into the Commissaries and label food items?

**Dwyer:** These are the things that are put in supermarkets on the shelf in front of an item. It is called the Shelf Talker because it tells the shopper at the point of purchase what is in it, what he/she is buying. The basic thrust of this campaign, as you'll be able to see from looking at a couple of these things, is to provide an environment of free choice, to inform consumers (about nutritional matters) at the point of purchase in a supermarket. The notion is that when you're in a supermarket, you're thinking primarily about buying food and it is at this point they try to intervene! These materials, these Eater's Almanacs, the big posters, and so forth were all screened by the National Institutes of Health, Heart, Lung and Blood Institute and by the Food and Drug Administration. Dr. John Vanderveen is also on the committee and also for Giant Foods.

Now, the reason for going with Giant was simply that it got done probably about a decade sooner than it would have gotten done if it had just been within the Government. I'm not being critical, but it's true. In 20 months, they were able to get the project going with the very fine supportive services of NIH and the FDA. The only thing that happened was the interest groups, the trade representatives, which you would expect to be upset, called and expressed their concerns. This approach to consumer education does not say that anything is poisonous or awful but simply shows the alternatives available and allows people to make up their own minds. The Shelf Talker program covers a large range of topics.

**Jacobs:** Have they had a chance to do any evaluation studies?

Dwyer: Evaluation studies are ongoing. We are having a meeting soon to do a preliminary evaluation. There are two kinds of measures that are being used. The first one is a pre-random sample, surveys in a store where they are not doing the "Shelf Talker". Surveys will also be conducted in the middle and at the end of the project. The second study they are doing is the most interesting part; Giant Foods has a very sophisticated computer, which permits them to do time-series analysis of different products. Now, obviously, you can't do it for ten-thousand products because it costs too much, but what we tried to do is to select about 20 groups of foods to look at to see if this campaigning has had any effect on purchases. What we expect is some effect that would be around 5-10%. The best example I can think of is smoking. Most of you people don't smoke, or you don't smoke in public, or you don't seem to be smoking here; and it's this kind of change, which is not coercion, but simply a sort of social conformity. This social conformity is what we're talking about when we talk about applying this approach to nutrition education.

Vanderveen: If you do any advertising whatsoever, whether it's on a paper bag, or in a store, or on a label, it can be regulated by law. What the FDA is doing here is giving approval to an experiment and that's why they refused to do it for years. The Giant Project tried to do something similar before but found regulatory barriers. In other words, they were first in the labeling ideas.

The incident that you're referring to was when Ms. Esther Peterson tried to label carrots. She wanted to put up a sign above carrots which indicated the nutritional value, and that was not acceptable to some of Giant's lawyers. They were afraid that Giant would be fined. Actually, fresh fruit and vegetables were an exemption for nutrition labeling, and the issue, therefore, was not real. However, FDA regulations require full nutrition labeling when a nutritional claim is made for a particular food. In the NIH study cited, the Shelf Talkers were generic in nature and exempt from this requirement.

Jacobs: You mentioned at the beginning that the goals of evaluation you were describing are the ideal. In human factor studies, for example, which is quite analogous to program development, the Commander states that human factors should be implemented all the way down the command chain. The only way that it ever really works is if the evaluator participates in the early planning, and if you have a program manager that can hitch together the Alice-in-Wonderland separation of within-service and between-service mission. I assume that's true in USDA as well; the events, the things which allow you toward the ideal.

Wargo: I have personally used, and I have seen others successfully use, the development cycle that I have recommended. A necessary step for successful implementation of the procedures is to obtain high level support at the very beginning of the effort. The recommended development cycle is a time-consuming and a costly process. Nevertheless, there is a higher probability of developing a successful program by following my prescription than by not doing so.

Maybe Luise Light can comment on this. Do you know anything about this, Luise?

**Light:** There are two branches of our division becoming involved with these activities. One of these branches is in the Science Education Administration. It's part of the USDA which has in it the extension service, formally called Agricultural Research Service, and my branch which is the Human Nutrition Center; the other branch is the Food and Nutrition Service. The latter agency does not program. The new unit which Dr. Wargo is a part of is a unit of the administrator's office, which does planning and evaluation-related activities. Both units have nutritionists and evaluation specialists. We have all worked both independently and together on a variety of projects. There are several members of Wargo's office, who are currently working on plans for evaluating nutritional outcomes of the food stamp program, the child nutrition programs, and the nutrition education and training programs. How many people do you have in your office?

**Wargo:** The Office of Policy, Planning and Evaluation currently has approximately twenty-five professionals. My staff, the Program Evaluation Staff, has about nine professionals aboard but will soon have fifteen to twenty professionals from the nutritional, medical, and social science disciplines. We are in the process of developing an evaluation program for the Food and Nutrition Service that will result in the periodic assessment of all FNS programs. We have begun evaluation of the National School Lunch, WIC, Child Care Food, and Nutrition Education and Training Programs. I expect to begin evaluating the remainder of our programs (Food Stamps, Food Distribution, etc.) within the next two years.

**Maller:** My comment on the program evaluation steps you outlined is that this looks horrendous; why go through all of that? One of the problems -- a sort of a human psychological problem -- is that we all have set ideas about how things should come out. We really don't want to be told otherwise. Can you comment?

**Wargo:** Basically, the development cycle that I recommend is one that is public and subject to periodic reality testing. It is public in the sense that program objectives, the model development process, and evaluation of model outcomes are documented and subject to continuous review and modification by the design team and its clients. It employs periodic reality testing of the program in the sense that the model development, evaluation, and modification process is an iterative one, subject to continuous review by the development cycle ensures that the program will be subject to periodic criticism and evaluation prior to full scale implementation. In short, the suggested cycle should prevent irrational or infeasible pet theories or biases from negatively impacting the development process.

**McCorkindale:** There's one problem I'm not too certain you addressed or perhaps there's a language problem, which is the choice of criteria you use to assess your program? We think of the last two or three days of this conference and the various ideas that have been kicked around; what is it we're basically trying to do? Is it to improve fitness and health, and is it long-term or short-term effort? Is it changing cognitions, behaviors, attitudes, and/or motivations? This gives rise to an enormous number of potential criteria. How do you suggest we find all meaningful criteria?

**Wargo:** If you were responsible for program development and asked me as an evaluator to specify the criteria that should be used to assess the program under development, I would say, "Let's forget about criteria; let's talk about specifying the objectives of your program."

What are you trying to achieve?" Once we define the primary objectives in measurable terms, the criteria problem is well on its way to solution.

**McCorkindale:** How do you set about getting that?

**Wargo:** First, you must define the target population and their needs. Then you must decide what needs you wish to address by the program and what level of need reduction you wish to accomplish. Once those decisions are made, a program can be developed that is appropriately targeted and that can achieve the desired level of change in participants. The criteria for performance will be the specified levels of need reduction desired. The program should be evaluated in terms of the discrepancy between program outcomes and those outcomes that were desired.

**McCorkindale:** I think it's really an unsolvable problem. In a sense, there's no single procedure which says, "When you hit the criterion problems, when you hit the objective problem, do this and magic will operate; it will now work." Everyone speaks to everyone. Hopefully, a clutch of criteria will emerge.

**Unidentified:** From our nutritional surveillance studies, we found that food preparation and the value of the food served at times was very poor. I hate to see us push together a nutrition education program and go through it all and after you come out at the other end find out that what you are measuring is food quality. Right along with this, I think that one point was mentioned that we do need to have the cooks become more professional in the Military. They need training and this has been not only found out by people at Blair but, also, in the Operations Research Branch. Now, I don't exactly know what this conference or what people here can do about that, but I think it really needs to be kept in mind in combination with education. Something has to be done about training.

**Lachance:** That's an important message. I really think that has to be emphasized.

**Kehoe:** I wanted to make this comment before this session is closed and we go home. I think that the program planners or the developers of this nutrition education program are going to be pulling all this data together and coming up with the goals for a Nutrition Education Program in the Air Force. We will need to also address another aspect of the Food Service Program and that is the policies that are used by our food services. I say this advisedly because we are subject to great pressures politically on some quality of food that we are to procure and serve in our dining facilities. When goals of our nutrition education program have been established, these are going to have to be relayed to us through the Department of Defense's food procurement policies so that it can be implemented throughout the procurement system. I specifically address the problem of ground meat. Ground beef is a great economic factor and a great political issue and we are forced too many times to change standards that we as nutritionists or dietitians may not feel are in the best interest of our consumer, but for other outside influences, we are forced to make those changes. So, if we're looking at the level of fat, for example, as one of the goals of our nutrition education program, the procurement of food process must be addressed and looked at the same time.

**Unidentified:** It's an important point to make and it's all got to fit together; that's why it has to be done in a well-integrated manner. You need that solid policy content. What are we trying to accomplish before we start monkeying around with other things that will buttress whatever we really decide? Otherwise, if we go off in several different directions at once, we will produce conflicting activities.

**Lachance:** I can't help but plead with you again. You just brought up the question of food policy. I tried to point out to you the importance of this concept. There's a difference between nutrition policy and food policy. If you call your program Nutrition Education or Nutrition Policy, you're going to lose because a food policy won't take place. You have to tie the two together, and it's so hard to get that message across. We don't seem to understand the semantics and how important these semantic differences are. I've been crying in darkness for years and I don't know why. I keep hearing it; I keep saying, "I don't understand why we don't see that!"



## A VIEW FROM THE OTHER SIDE:

### AN AFTER DINNER ANALYSIS

Kenneth Corkindale

General Myers, Mrs. Myers, General Greendyke, Mrs. Greendyke, ladies and gentlemen. Let me tell you now that I shall never live up to the advanced billing. I would suggest that you leave while I'm still winning. But, first of all, let me start by saying how very privileged I feel to be here at all and to have the opportunity of sharing with you these three days which for me, and this is after the first day, have already justified my coming across the Atlantic. If you knew how I felt about traveling, you would realize what a compliment that is. Ever since the Queen Mary went, traveling is not the same as far as I'm concerned.

When I was first told, in fact, ordered is a better word, that I was going to say a few words, I wondered what on earth you can say at an after dinner talk at a conference on nutrition? I can't make any remarks about the food we've all had because you would think either I was being rude for the sake of it or I was being flattering to be polite. (I thought it was an excellent meal, if I may say so.) Other people should eat for their health; I eat for fun! In addition to thinking of something to say at a time like this, I'm also very conscious of the fact that, although we all speak the same language or at least we think we do, I support Oscar Wilde's observation, "that we are two countries separated by a common language." Therefore, if I say anything that is obscure, obscene, or even profound, I can assure you that it is entirely by accident! In fact, the last time I was in Washington for a conference in the Pentagon, as part of a three-man U.K. delegation, we spent some little effort, which is a British understatement for we sweated blood, to produce a document. We thought it was the last word on something or other. The leader of the delegation proudly announced when the item came up on the agenda, "Yes, the British delegation would like to table this report, so put it down," and our American colleagues sat and looked at us and we looked at them. It became obvious after a long time, it seemed like 2½ days, that everyone was wondering what the hell the others were doing. It turned out that when we actually asked, "what the hell are you doing?", there was a very interesting little difference in the use of those words to us. To us, to "table" a report means to put it on a conference table so that we can discuss it. We understood very rapidly that you meant what we would call to "shelve" it! So we all sat there wondering why the others weren't doing anything. With that excuse for not saying anything at all of any note, I'll continue!

I did try to think of Irish jokes because Irish jokes are very popular in England; they're not very popular in Ireland. Then I began to worry — what about the cross cultural differences? Of course, my favorite Irish nutrition joke is about the Irishman who's ambition for years was to become the landlord of an English Pub. He particularly wanted to concentrate on the food aspects; of course, drinking beer is all very well but food makes the money as well as brings in the customers. So sure enough, one day he actually won money in the Irish Sweepstakes. At last, his ambition! So he bought a Pub, an Inn in England and he wondered what he could do that was different, that was typically Irish. And eventually he thought of the ideal food-typical Irish food in an English Pub, "Soup in a Basket". For those of you who have never eaten in an English Pub you will just have to ask for a translation later.

However I suppose one thing I can do is to bring you an encouraging message from the other side of the Atlantic which is, "Yes, you do have problems and you are not alone." We have the same problems; we don't know the answers either, which is really why I'm here. The three Services in England (we don't count the Marines, especially when they are not present) after some discussion formed a Tri-Service committee. To be exact the panel is called SNAP, The Services Nutrition Advisory Panel, an interesting English joke in the sense that "SNAP" also means meal in various strange dialects. The panel had its first meeting on the 3rd of May, under a month ago and it's because of what was said at that meeting that I'm here at all. We found out, what became general knowledge, if you like, within the Ministry of Defense (for the first time on the 3rd of May) that this very meeting was scheduled. I have the minutes of the meeting, the very first one. It is of some interest that amongst the decisions taken, the members of Tri-Service Panel, are at the one-star level, and that there is a need for intensive health education to prevent obesity — full stop! We don't know how we're going to do it but we've made the decision as a need: Yes! You have a problem; yes, we have a problem. Let's hope that one of us can find an answer!

In the Army Department, we have an interest in nutrition. Yet looking back it seems that we didn't know where we were going. I suppose it is characteristic of any program I'm associated with. For many years, as some of you know, we've had a fairly active program in anthropometry and we've had a fairly large survey of body size within the British Army for obvious sorts of reasons. Also, more recently, we've been involved with the introduction into the British Army of a program called "Fit to Fight" which is the physical fitness program. And just to digress, which is something I enjoy very much, there is some interest in the British Army for the moment in two major programs which have been highlighted by the particular interests or needs of the soldier. The first one was called "Shoot to Kill." (It seemed a fairly typical military type activity.) The second one was called "Fit to Fight." So we've covered shooting and physical fitness. Now, if you think of the usual activities of soldiers, there's been an interesting book being made of what the third working part is going to be and how we could possibly publicize it.

One interesting thing which we've already encountered which I think from speaking to some of you today or speaking with some of you today, (Once again an interesting difference. In England you speak to people and here you speak with them; much more democratic!), has been the fact that we've highlighted the conflict between the medical side in the Army and the catering side in the Army both of whom adopt an entirely different set of criteria. I'm slightly impartial in this conflict. However, I find it interesting that both are right and yet both can't win. We've got to find a way of resolving the conflict between the medical nutritional requirements; I'm thinking of obesity, physical fitness, and the caterer's point of view. They are in straight conflict with commercial undertakings, if they don't supply what the soldiers want (and we have got to think of food at this point), they can go outside for it! And, once again today, I was most interested that many of the numbers that were being quoted about the caloric intake of U.S. service men fitted in remarkably well with the surveys that we've done, and tomorrow there's a paper on alcohol and I should be interested to see whether our figures and your figures agree and who has the worst hangover!

Alcohol, one of my more personal interests, not a professional one but a personal one, is one topic we have studied over the last few years on a somewhat informal basis, and for rather obvious reasons we wouldn't like to publicize it too often! That is what soldiers take with them in the way of food and drink when they are actually going on field exercises for a week or a fortnight, when they know for real that they're going to be on their own. And in one exercise I was associated with, fairly large by our standards, a fairly large study was called Exercise Early Call. You may have heard of it. It was an exercise on human performance in continuous operations focusing on infantry tasks. The interesting thing was the quantity of beer in cans the soldiers put into their packs. The favorite one was some local brew called Newcastle Brown Ale, and this is a member of a class of beers in England which tend to be called the fighting ales; but of course, a couple bottles of that and you're ready for anyone. It seemed very suitable for soldiers. It brings out an interesting point which the Military has stored. My acquaintance, John Keigan, has pointed out in one or two articles and books that there has been a very long association between the Military and alcohol. Indeed, I think it's fair to say that bread, beef, and beer has been kind of a staple diet of the Army. If one were adopting an historical point of view, it's a problem we're posing to ourselves. That is, how are we going to break this kind of tradition? That's what we are trying to do. And coming from an Army that holds tradition dear, trying to break a tradition is not something you enter into lightly, especially if people begin to think you are a sociologist. It's not the most rapid way of becoming popular with Generals, present company excepted. In fact, when you think the Indian mutiny started over a small nutritional problem, it's quite a problem. One other thing that interests me (because of the job that I'm in) is, I can imagine ways in which we might solve the nutritional problem, but make terrible problems for our selves in other areas. It's easy to imagine by brainwashing, by suitable educational programs, or I think of the word **propaganda**. You may prefer to think of other words, but we could at least ameliorate the nutritional problems and find that we've substituted in their place problems of recruitment, retention, morale, and problems about fighting spirit. There's always the feeling, rightly or wrongly, that a diet of meat protein (they play hell with you when you're in your forties) gives you that get-up-and-go feeling in your early twenties! It's obvious that we've got a common problem. One begins to think (in my case, I begin to think) — Should we be striving for a bit of common work? We've got what appears to be a fairly similar situation in that we're worried about the problems of the soldiers. Perhaps we should at least be thinking of exchanging information (not that I can offer you any solutions), but we might be able to stop your wasting your time if we waste ours!

Let's say that I'll leave you with a happy thought, that (A) Yes! I'm convinced the problems are important; (B) I'm fairly convinced none of us at the moment has the solutions, but I'm optimistic; and of course, I think thirdly, and finally, that the problems are soluble. I think we will solve them! Thank you very much.

## CONCLUDING COMMENTS

Max Milner

I hope that some of the points I have jotted down will strike a responsive chord. What are the fallouts from this conference? What are some of the bottom line impressions?

One of the most fortunate developments from these discussions is that nutrition workers of the Armed Services, perhaps for the first time, have personally found each other as individuals and as professionals. And lo and behold you discover you have common problems, and you are now more aware of what the others are doing! Thus you appreciate the similar difficulties you all face in making an effective professional contribution in the Armed Forces. These are problems every professional encounters in our organized society -- namely, lack of adequate organizational frameworks and resources, and lack of sufficient comprehension by the powers that be of your capacity to contribute. Unfortunately, these are not the kinds of problems the professional societies to which you belong (whether the American Dietetic Association, the Society for Nutrition Education, or the American Institute of Nutrition) can help you to deal with as individuals.

I wonder whether the motto appearing on our country's currency is pertinent, that is E PLURIBUS UNUM; in other words, is there strength in unity? I believe you need a more permanent or regular means to carry on the kind of communication which was initiated at this meeting. Are the problems you all deal with related only to food and nutrition or are they policy, regulatory or procedural problems within the Armed Services? Continuing discussions of this kind would surely clarify the major issues which are impeding your full effectiveness as professionals. Perhaps a small committee could begin here to plan such future discussions, involving individuals representing various groups such as Natick, Letterman, the Office of The Surgeon General, and the various branches of the Armed Forces.

Another problem which seems to have emerged, not surprisingly, is that clinically qualified nutritionists, that is the M.D.'s, rarely if ever deal sensitively at the professional level with dietitians. This is unfortunately a fact throughout our society. I would propose that resolution of this problem might begin with a professional meeting specifically set up to stimulate dialogue between clinicians and non-clinicians serving the Armed Services. This possibility might first be tackled in the annual meetings of your professional societies. When the problem is approached in this manner, the professional societies will surely be pleased to provide assistance.

As you have learned at this conference, you can count on encouragement for this kind of activity also from FDA, HEW, USDA and certainly the National Nutrition Consortium.